

MARINE REVIEW.

VOL. VII.

CLEVELAND, OHIO, THURSDAY, MARCH 23, 1893.

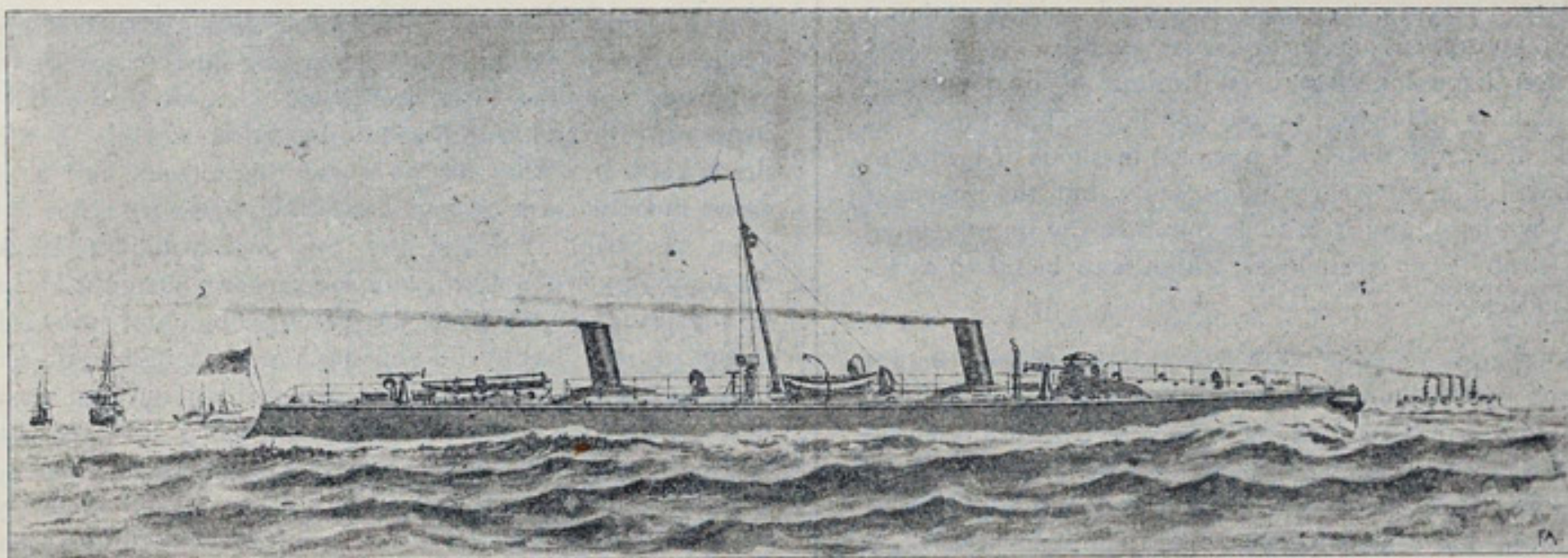
No. 12.

Improved Outlook in Freights.

A movement in ore for next season's delivery has finally begun, and although the sales have not as yet reached a volume of sufficient importance to warrant a settlement of contract rates of lake freight, a further advance in the pig iron market, and the conclusion of negotiations now pending between furnace men and iron ore dealers, may result in a very large part of next season's business being closed up within a few days. Bessemer pig iron is held at \$14.50, and although up to this time no sales have been made at \$14.25, as reported from Pittsburg early in the week, offers of better than \$14 have been submitted to both Pittsburg and Cleveland dealers, and they have been summarily declined. Thus the pig iron market, with an advance of more than \$1 a ton over the lowest prices reached four or five weeks ago, shows a decided upward tendency, and activity in ore sales is delayed only by uncertainty as to the outcome of the present strong feeling in iron. Irrespective of the attitude of the two leading steel works of the country, the Carnegie and Illinois concerns, on the question of ore prices, some of the smaller manufacturers have gone into the market and made purchases on a basis of \$4 for Aurora, one of the standard Gogebic ores. This is the price which the big steel companies refused to pay for

trips immediately following the opening, but there is no rush of tonnage to accept the offer.

Active preparations are being made for the big trade in soft coal that is assured by the great scarcity of supplies at upper lake ports. The rail rate from the mines of both the Pittsburg and Hocking valley district has been fixed at 90 cents, or an advance of 5 cents over last year. This advance will act against the coal shippers who contracted, a few days ago, at low prices with the Canadian Pacific Company for its coal. About 90,000 tons of this coal will go by lake to Fort William and Port Arthur, 15,000 tons to Rosport (formerly McKay's Harbor), 10,000 tons to Heron Bay and 30,000 tons to Algoma Mills and Owen Sound. The Port Arthur and Fort William portion of the contract is divided between the Morris Coal Company of Cleveland and W. L. Scott & Co. of Erie, and the Algoma Mills and Owen Sound portion was secured by the Cuddy-Mullen Coal Company of Cleveland. The Morris company also secured the contract for Rosport and Heron Bay delivery. No part of this tonnage has as yet been covered by lake freight, and if lake freight contracts are made on it, they will probably not be closed until vessel owners have had a settlement of ore freights. The usual contracts on blocks of coal for the head of Lake Superior have not



U. S. TORPEDO BOAT NO. 2.

(For description see page 13.)

Norrie, Ashland, Aurora, and other standard soft Bessemer, and now with the iron market tending upwards the managers of these properties are rather disposed to take chances on securing, a little later, some improvement on the figure at which they offered to sell on a big scale a short time ago. On this account the sales are not of sufficient extent, as yet, to go into the lake freight question and no rates have been fixed.

On \$4 as a price for the standard ores, the shippers are still expecting to establish a freight rate of \$1.15 from the head of Lake Superior—some of them even talking of \$1.10—but the developments of the past few days are certainly favorable to improvement in ore prices, and no matter how the ore market may go, it is very doubtful if any considerable amount of tonnage can be secured on season contracts for less than \$1.20, at the lowest. Soft Bessemer ores on dock are entirely cleaned up, and the chances of a big improvement in iron are such as to make vessel owners very cautious of accepting even fairly profitable freight rates. Vessel owners argue that while it is true that the demand for grain is at present unimportant, the elevators of Chicago and Duluth are overcrowded with it and a movement at some price must result before the season is far advanced. Duluth brokers are offering 3½ cents a bushel on wheat for vessels to make two

been made, but it is probable that the rate will be 50 cents. The Northwestern Fuel Company is understood to have purchased 600,000 tons of Wheeling & Lake Erie coal to be shipped from Huron. If the amount is correctly reported, Huron's dock facilities will probably need improvements, in order to handle the tonnage.

Mr. Doran on the Alien Engineer Question.

James S. Doran, superintending engineer for the International Navigation Company, owning the American steamers Paris and New York, is one of the foremost men in the marine engineering profession in this country. He was asked by the REVIEW for an expression of opinion relative to the licensing of alien engineers for these steamers. He pleads pressure of business as a reason for being unable to take up the subject at length, but says, "I have no doubt if this matter was placed in the proper light before the native engineers that it would have a good effect, as no man can be an engineer without having a fair amount of common sense. I am aware that there has been a good deal of talk and there is, perhaps, some feeling against the licensing of the men who are now the engineers of our big ships, but I am satisfied that it would very soon disappear if the men thoroughly understood the subject."

The Engineer and the Modern Steamship.

Prompted by the recent action of Mr. Charles Foster, late secretary of the treasury, in sanctioning the retention of foreign engineers on the American steamers New York and Paris, a prominent marine engine builder of the lakes furnishes the following discussion of the relations of the marine engineer to the modern steamship. It is a conservative review of the subject that is certainly worthy of careful reading and consideration from vessel owners:

"Mr. Chas. Loring said, in a late issue of Cassier's Magazine: 'The steam engine is a machine which has been the prolific parent of other machines. It has caused the invention and construction of the immense plant of ingenious power tools employed in its own fabrication; it has caused the improvement of metallurgy as a science, and of the various methods of metal manufacture as an art; it may be said to have created whole branches of important manufactures, and to have been the occasion of the invention of the immense mass of highly diversified machinery by means of which these manufactures are practiced, and last and greatest, it has stimulated the human intellect as nothing else ever has, and has done more to advance human nature to a higher plane than all that statesmen, generals, monarchs, philosophers, priests and artists have ever accomplished in the vast interval which separates original man from the man of to-day.'

"These are strong utterances, but they are literally true. Nowhere is the improvement worked by the steam engine more apparent than in the modern steamship, and where are there more modern steamships than those of our own great lakes? A few are larger and faster perhaps, called into existence for a special purpose, but the rank and file, so to speak, of our lake steamers, are equalled nowhere in the world. Nowhere in the world have the advances in marine engineering been greater in the past few years. A few years ago even our largest and best lake steamers were not complete without a considerable share of the unwieldy top hamper necessary to take advantage of favorable winds as an assistance to the propelling mechanism. Moderate speeds were the rule, because the power necessary to improvement along this line could only be obtained at the cost of a great increase in the weight of boilers, machinery and fuel supply, thus entailing not only greater prime cost, but also reduced carrying (earning) capacity. Now we see daily fine specimens of marine architecture, in some cases not larger than those of former years, destitute of top hamper, carrying larger cargoes at greatly increased speeds, and at a lower cost per ton-mile than before. How has this come about? The dangers and difficulties of navigation have doubtless been diminished by deepening certain channels and the placing of lights, ranges and buoys, but these will not get a vessel through the water any faster. Improved methods of hull construction have also contributed to greater carrying capacity, but the principal reason must be sought for elsewhere, and it is to be found in the improvement previously spoken of—the propelling mechanism, which is to be taken as including both boilers and engines.

"The modern triple-expansion engine, with its greatly reduced weight per horse power and its still greater reduction in fuel consumption, has enabled us to give steamers from 25 to 50 per cent. more power with the same total weight of material than formerly. In time, owing to the improvement in speed, the cumbrous masts and sails, with their mass of rigging, were found to be more of an obstruction to the vessels' progress than an assistance, since the times when they could be used as an auxiliary were found to be fewer than when they were either offering a resistance to the air or were simply a useless encumbrance. The greater freedom of the improved machine from breakdowns also did away with another reason for their existence. Their banishment meant in some instances an increase in carrying capacity of 30 or 40 tons on the same draft of water. The real work of the modern steamer is done below decks, in the engine room. In former times, when the weather and the skipper's judgment were the element's in a vessel's movements, the captain was, and very justly, considered the most important personage aboard the ship. But the causes which brought him into such prominence no longer exist. When vessels go to sea they no longer go with sails, but with steam, and once the 'all right' whistle is sounded it is more a question of the endurance of the machinery and the watchfulness of those in charge of it, than of the 'bridge.' It is very questionable whether our lake owners fully realize the importance that this question really deserves. There is more money concentrated in the engine and boiler rooms than any other part of the ship, and the success of the whole depends upon the proper management of that portion. We have never seen that the ship accomplished very much once her engines stopped. But of what does this proper management consist? Obviously, it begins with the owner, and consists essentially in the selection of a competent chief engineer. This is the key to the whole matter. The selection should be made with care, and with an eye to the results, and not simply to 'how much money.' A careless and incompetent chief can waste more money in one trip than his whole month's or season's salary will amount to. In this, as in everything else, you can not get something for nothing. The man needed is not the blatant 'I' we are, unfortunately, so familiar with. He is seldom there in an emergency. His ship, his business, and his owners he makes second to himself. The engineer we want is the man, quiet, self-respecting and firm. He recognizes the dignity of his business, and makes it and himself respected.

He knows his owners' interests are his first care, and this includes the safety and well-being of everything and everybody in his department.

"Now we have our engineer, what next? We give him full charge of his department. He is to engage his own staff and fix their compensation. He is the best judge of their value. You cannot sit in your office and judge of the value of the fireman who is burning your coal. He has, perhaps, a good fireman who asks a trifle more per day; rather than give it to him you will let him go, and the next man burns two or three dollars more coal a day than the one you let go. Is that good business? Do not tie your chief down to the exact number of men he shall employ or how much he shall pay them. If you restrict him in what his judgment tells him is necessary it will only result in loss to yourself. But if you pay that much of a compliment to his judgment and give him your confidence, he will respect it and be the more alive to your interests. Do not allow any interference with his government and he will not meddle outside of his own department. 'But,' say the owners, 'where can we find men to whom we dare give so much sea-room?' It is your own fault, gentlemen, if they are not to your hand, as we grant there are not many, and those that are, are looking for a good chance to get out of it. The demand was never yet for a man for any position of trust that could not be filled.

"But the methods that have ruled in our lake marine have driven many such men as you should have into other occupations. With a penny-wise and pound-foolish policy you have haggled over trifles and failed to see that our magnificent lake steamers of to-day are anything more than the humble hookers of years ago. You ask the same crew to take care of your 2,000-ton craft, with her 1,000 horse power and two or three boilers carrying pressures that fifteen years ago would have made your eyes bulge out; that, at that time, were thought none too many for the little hooker with her single engine and old low-pressure boiler. Now, your steamer gets into port in the morning, perhaps, after driving hard for 900 miles, and before dark 2,000 tons of cargo have been taken out and your fuel aboard, and away you go for another load. But, meanwhile, below decks all hands have been working like slaves, cleaning hot boilers, overhauling greasy engines, and getting or trying to get, everything in shape for a good start, though their watch just ended when port was made. No matter, the work is there and it must be done, rest or no rest. And the chief who you hold responsible for all this mass of machinery, and who will have to walk the plank if anything goes wrong, was working as hard as any of them. How can he, then, be in a condition to give his best attention to your interests while going through such a grind? He can't, and doesn't try to. Bye-and-bye something has to go for want of attention, and you calmly pay the bills, and think it is part of the business. You say 'Our boats run all right, and are doing good work.' You only guess at it; you don't know it. They do no worse than others, and no better. How do you know that the three or four hours you lost with a hot journal could not have been avoided? You lost the 'Soo' by that delay, and that meant a day. Or, an air-pump broke down, and so you lost your dock and some other fellow got in ahead of you—another day gone. The chief was going to examine these things in port, but he did not have men enough to do everything in the short time he had. Some other boat comes along and you know your boat can beat her. It may mean hundreds of dollars to you to keep ahead of her, but you are saving 25 cents a day on a fireman who can't keep the steam up to the fighting point, and so you drop to the rear. Next winter you want to sell that boat, but the man who was just going to close thinks your boat is not just what he wants in speed, and flies the track. See what you saved in the firehold? If you have a number of boats, you want at least one such man to look after that end alone. If you get him you needn't worry about the rest. We know, and every other builder will bear us out in saying, that boats that are looked after by a good chief engineer more than save his cost in repair bills, to say nothing about the higher efficiency attained. But the practice does not extend far enough. Your chief in this case should be a man you can advise with. He should be well up in the theory of the steam engine, as well as the practice. And when you build your new steamer, let him have a chance to say a word. Don't leave it all to the shipbuilder, and you will find it will be money in your pocket.

"I may have more to say on this subject later, but before parting I want to add that one of the most disgraceful things I ever heard of an American citizen was the late decision of Secretary Foster in regard to the engineers of the New York and Paris. He prostituted himself, his office, and American citizenship at the bidding of a corporation. Where is the pride of Americans gone to? We used to think we could excel all other nations in anything we put our hands to, and a few of us think so yet. I hope the REVIEW, and all other papers, will make war on that decision. Why can't you circulate a petition among our ship and engine builders and send it to the new secretary, and make an effort to have that ruling reversed?"

ST. MARY'S RIVER CHARTS NOS. 1 AND 2 FROM POINT IROQUOIS TO E. NEEBISH AND FROM MUD LAKE ENTRANCE TO E. NEEBISH, CORRECTED TO AUG. 30, 1892, CAN BE HAD AT THE OFFICE OF THE MARINE REVIEW, 516 PERRY-PAYNE BUILDING, CLEVELAND, FOR 20 CENTS EACH, OR BOTH BY MAIL FOR 50 CENTS. BOTH CHARTS WILL BE FURNISHED WITH CLOTH BACKS AND BOUND EDGES FOR \$1.

Appointments of Masters and Engineers.

Loutit, W. H., Grand Haven, Mich.: Steamers—Mary A. McGregor, Capt. Thomas Cambridge, Engineer H. O. Hand; Mary H. Boyce, Capt. W. F. McGregor, Engineer M. Malar.

Underwood & Coman, Menominee, Mich.: Steamers—John C. Pringle, Capt. Thomas Dunn, Engineer John Burns; Artic, Capt. John H. Baxter, Engineer Chas. Rowe. Schooners—B. Harrison, Capt. William Johnson; Sweetheart, Capt. James Jean.

Marine Transit Co., Marine City, Mich.: Steamers—Aztec, Capt. Fred. Howe, Engineer Charles Diem; Toltec, Capt. James Taylor, Engineer Charles Pierce. Schooners—Zapotec, Capt. P. Thomson; Miztec, Capt. James Owens.

Hebard, Charles, Pequaming, Mich.: Steamer—Charles Hebard, Capt. James Parsons, Engineer William Shoomaker. Schooners—Annabel Wilson, Capt. Daniel Nathan; Aloha, Capt. Robert H. Sunderland; Annie M. Peterson, Capt. Chas. Bough; Ben Brink, Capt. Ole Gundersen. Tugs—Daniel L. Hebard, Capt. Hugh McKenzie, Engineer Joseph Greenleaf; Jay C. Morse, Capt. Fred. E. Rogers, Engineer Charles Fisher.

Elphicke, C. W. & Co., Chicago, Ill.: Steamers—Arthur Orr, Capt. C. Z. Montague, Engineer John Stately; Josephine, Capt. John Massey, Engineer August Cobo; Ohio, Capt. S. O. Marsh, Engineer William Frazer. Schooners—Thos. L. Parker, Capt. C. W. Seeley; C. P. Minch, Capt. William Kaufman; F. W. Gifford, Capt. E. G. Kohnertt.

Cummings, W. J., Oswego, N. Y.: Steamers—C. S. Parnell, Capt. P. Griffin, Engineer James Cary; Monteagle, Capt. William Griffin, Engineer Mr. Purvis.

Gain, R. E., Port Huron, Mich.: Steamer—W. H. Sawyer, Capt. R. E. Gain, Engineer Thomas Trealeven. Schooners—A. C. Tuxbury, Capt. Eugene Goodwin; C. E. Redfern, Capt. Wyman Powers.

Corning & Edgar, Saginaw, Mich.: Steamers—C. H. Green, Capt. John C. Garey, Engineer John Derry; Oscoda, Geo. W. Ryan, Engineer George Merrill. Schooners—Our Son, Capt. Wm. A. Edgar; Ida Corning, Capt. D. C. Ryan; Genoa, Capt. John Nagle; C. G. King, Capt. Peter Edgar; A. C. Keating, Capt. Patrick Ryan.

Kingston and Montreal Forwarding Co., Limited, Kingston, Ont.: Barges—Thrush, Capt. Leon Poegent; Condor, Capt. Demosse Perron; Hiawatha, Capt. Emanuel Leduc; Lapwing, Capt. Joseph Leduc; Dakota, Capt. Moisse Chatel; Herron, Capt. Jeff Hebert; Cherokee, Capt. Thos. Laurin; Iroquois, Capt. Frank Mathew; Beauport, Capt. Narcisse Garnlin; Jet, Capt. Disette Senical; Siren, Capt. Triffie Hebert; Lark, Capt. Homer Perron; Bismarck, Capt. M. St. Michael; Princess, Capt. Joseph Perron; Virginia, Capt. Jeff Perron; Mona, Capt. William Gilmour; Elm, Capt. William Porter; Rapid, Capt. Harvey Hopkins; Snipe, Capt. Paul Reid.

Leisk, Henry, Milwaukee, Wis.: Steamer—P. J. Ralph, Capt. Henry Leisk, Engineer John J. Burns. Schooner—Harold, Capt. Thos. Leisk.

Flint and Pere Marquette Railway Line, Ludington, Mich.: Steamers—F. & P. M. No. 1, Capt. M. McRae, Engineer H. De Clute; F. & P. M. No. 2, Capt. J. Mooney, Engineer E. S. Hine; F. & P. M. No. 3, Capt. J. Stewart, Engineer Robt. McLaren; F. & P. M. No. 4, Capt. J. Russell, Engineer T. McLaren; F. & P. M. No. 5, Capt. C. E. Moody, Engineer C. H. Wilcox.

Livingstone, W. A., Detroit, Mich.: Steamers—Thos. W. Palmer, Capt. Geo. F. Stilphen, Engineer Robert B. Hodge; Livingstone, Capt. Wm. H. Wilson, Engineer Alex. Morison.

Craig, John, Toledo, O.: Steamer—J. B. Ketchum, Capt. Martin Christie.

Buckley, Edward, Manistee, Mich.: Steamer—Edward Buckley, Capt. Chas. Gnewuch, Engineer Richard Winkler.

Mills Transportation Co., Port Huron, Mich.: Steamers—Gogebic, Capt. W. D. Neal, Engineer Charlton; Newaygo, Capt. M. Madden, Engineer Wm. Warwick; Arnold, Capt. A. C. Neal, Engineer P. Merrill; Sparta, Capt. Wm. Ashley, Engineer Harris; Havana, Capt. Thos. Harbottle, Engineer Ed. Weiner. Schooners—Checotah, Capt. F. Marsden; A. Anderson, Capt. F. S. Tear; Sumatra, Capt. Thos. Cowan; J. D. Sawyer, Capt. J. J. Hogan; Baha-ma, Capt. J. Radigan; Yankee, Capt. R. Horsfield.

Pawnee Boat Company, Port Huron, Mich.: Steamer—Pawnee, Capt. G. H. Davis, Engineer S. Merrill. Schooners—M. E. Orton, Capt. J. B. Pierce; J. R. Edwards, Capt. E. H. Johnson; W. A. Young, Capt. John Little.

Graham & Morton Transportation Company, Chicago, Ill.: Steamers—City of Chicago, Capt. Charles McIntosh, Engineer Wm. McCluer; Chicora, Capt. Edward Stines, Engineer Rebert McCluer.

Dulac, William, Mt. Clemens, Mich.: Steamers—F. R. Buell, Capt. C. W. Woodgrift, Engineer, C. F. Lamb; Canisteo, Capt. Wm. J. Lynn, Engineer E. Miller; A. Weston, Capt. M. Hyde, Engineer John Hibbert; Norwalk, Capt. J. S. Ruby, Engineer Wilson; Chas. A. Street, Capt. J. B. Lozen, Engineer Dibald. Schooners—J. B. Lozen, —; A. Stewart, Capt. Geo. Pollock; Eleanor, Capt. Peter Peltier; Jennette, Capt. Frank Duboy; Elvina, Capt. Wm. Campau; Fulton, Capt. Frank Laforge; Eugenia Vesta, Capt. Eli Peltier; S. B. Pomeroy, Capt. Jas. O. Robinson.

Corrigan, James, Cleveland, O.: Steamers—Australasia, Capt. James W.

Morgan; Bulgaria, Capt. A. H. Gain; Caledonia, Capt. Ralph Lyons; Italia, Capt. C. H. Cummings. Schooners—Northwest, Capt. Patterson; Tasmania, Capt. Geo. Gain.

Corrigan, John, Cleveland, O.: Steamer—Aurora, Capt. Robert McDowell, Engineer Christopher Castle. Schooners—George Adams, Capt. Robert Donaldson; J. I. Case, Capt. Martin Johnson.

Crescent Transportation Company, Detroit, Mich.: Steamers—John M. Nicol, Capt. Albert Stewart, Engineer Geo. E. Tretheway; John V. Moran, Capt. Robert Rhynas, Engineer Geo. E. Lynn; Wm. H. Stevens, Capt. John Tyrney, Engineer Geo. B. Kelley; Eber Ward, Capt. Wm. McLean, Engineer Jas. G. Purvis; Jas. Fisk, Jr., Capt. Louis Elliott, Engineer Elmer Tucker; Samuel F. Hodge, Capt. Murry McIntosh, Engineer John R. Judge.

Inventions of a Marine Nature.

Specially reported from Washington for the MARINE REVIEW.

493,266—Submarine boat by James R. Haydon of Cleveland; filed Feb. 6, 1892; serial number 420,493. The gist of the claim is for a chamber at the bottom of the boat, and a system of pistons operated by a motor for regulating the amount of water contained in this chamber, thus raising and lowering the boat at will.

493,283—Nautical signal by James R. McGregor of Centralia, Wash.; filed July 16, 1892; serial number 440,251. A lamp is moved to the right and left behind a semicircular glass plate of several colors, the movement of the lamp being controlled by the rudder.

493,250—Steam-engine by George A. Coveow of Bay City, Mich.; filed June 24, 1891; serial number 397,303. An engine of the walking beam type. Copies of patents can be had from the MARINE REVIEW, No. 516 Perry-Payne building, Cleveland, O., at the uniform rate of 15 cents each.

Tonawanda Ore—Buffalo Port Matters.

Special Correspondence to the MARINE REVIEW.

BUFFALO, N. Y., March 23.—Is it possible that Buffalo has made the first ore charter of the season? The report is but partly confirmed, but such seems to be the fact. The firm of Rogers, Brown & Co., of this city and Cincinnati, with a furnace at Tonawanda that has turned out about 200 tons of pig iron a day all winter, is said to have taken of Mitchell & Co. of Cleveland boats enough of the Gratwick fleet to handle its ore for the season. Mr. Rogers is away, but at the office the report is not denied, though the boats can not be named and no rate can be obtained. It is hardly likely that a flat rate has been named. Our rates have always been a few cents over Ohio. The Tonawanda furnace has ore enough to last till navigation opens, but not much more.

There is no stir here in anything. Coal shippers are dumb; the early movement in lumber is over, and the managers of the package freight lines have no idea when spring rates will be made. It is not hard to surmise that they are eager to do nothing as long as possible, for anything that they may do is sure to be upset before it is fairly done.

The members of the pool once known as the Lake Superior Transit Line are fighting. When the Union line pulled out in 1889 it was found that there was \$7,000 in bank to the credit of the pool. This amount was claimed by the Union and Western lines on the ground that the Anchor line had violated the terms of the pool. The Anchor line sued the bank, which had been cautious enough to obtain indemnity of the other lines, and on Saturday obtained a verdict for the full amount, the judge holding that the violation was not such as should invalidate the agreement.

The Anchor line is preparing to add the propeller Conemaugh to its Lake Superior fleet, retaining the India, China, Japan, Philadelphia and Gordon Campbell as before. The only repairs, beyond the most ordinary ones, which the Anchor line is making this winter, is giving new upper works to the Clarion.

The Lehigh line will send some of its vessels to Lake Superior. Manager Gordon is looking for an extra late spring opening and said to me to-day that he wasn't expecting to get out of here before May 5.

The lumbermen have made known to the vessel owners their agreement in regard to unloading barges here. They have been at work all winter on a plan that should prevent the union lumber shovers from cutting up as they did last summer. The plan is to present a bill of lading that contains an agreement to allow the lumber dealer at his option to unload the boat at a rate fixed by the Lumber Exchange. This plan promises to tie the hands of the union shovers, and the vessel men are agreed so far, but they object to a rate that they have had no part in making. Buffalo is not in nearly as bad shape on the handling misunderstanding as Tonawanda. The union is not very strong here, but it is fairly supreme there and is very certain to make trouble with any boat that accepts the plan of the lumber dealers. It is to be feared that last year's fights will have to go on till some other plan is devised.

Fred S. Doty, formerly with the Chicago and Great Western Railroad line here, has been appointed general passenger agent of the Western Transit line. Every lake line running passenger boats to Lake Superior has now its separate agents all along the line, and if people don't go to Duluth and back for six-pence before August it will be strange.

Insurance Valuations and Ratings.

When the new Inland Lloyds Register appears shortly and some of the steel vessels on the lakes, which were all on an equality as to rating in previous years, are classed A 65, while others are classed at A 95, there will undoubtedly be loud complaint from owners whose boats are put in the inferior grades. The question of valuations for steel vessels will also be important, as it is understood that values will be revised in many cases. No steel vessel now in commission can be given the highest rating proposed for the new register, as the maltese cross, which will indicate the highest possible class, can only be given in cases where the vessel has been inspected through all stages of construction by a representative of the lake underwriters. When the rules for construction, now being prepared by Capt. F. D. Herriman, are ready it will be possible to give new vessels this rating, and the underwriters have allowed the impression to go out that if ships are constructed according to these proposed rules rates of insurance will be reduced.

It is not probable that any marked change in rates or in the form of policy will be made at the meeting now being held in Chicago. Capt. Herriman's returns on ratings for most of the steel vessels were submitted to the meeting Wednesday, and it is claimed that he will be upheld in the grading he has made, as well as in valuations which will be fixed at a session of the committee on values and ratings now being held in Detroit. It is certain, however, that the underwriters understand the power of a few vessel owners to make trouble in their ranks, if there is a marked degree of dissatisfaction regarding valuations, and the Detroit committee may go slow in its work.

Enormous Sales of Vessel Property.

Transfers of vessel property since the close of navigation, about Dec. 1 last, number eighty-two and the consideration involved aggregates \$2,653,800. This is a summary of all sales where there was a change in the control, but it does not include numerous transfers of less importance in which individual interests changed hands. It indicates great activity among buyers and sellers of vessel property, due almost entirely to prospects of profit in the season about to open. The aggregate amount of money involved in these transfers is certainly larger than in any previous winter, although the number of vessels may not be as large as in 1884 and one or two other years, when a very large number of smaller vessels were sold.

The latest and most important transfer is the sale of F. W. Wheeler & Co's Centurion to a company in which Mark Hopkins and E. C. Recor of St. Clair, and Capt. John Mitchell of Mitchell & Co., Cleveland, are leading stockholders. Mr. Wheeler also retains an interest in the boat. The company will be known as the Hopkins Transportation Company. The consideration is \$265,000. This is F. W. Wheeler & Co's 100th boat, which was illustrated in the REVIEW of March 2, when appropriate ceremony accompanied the laying of the keel. She is to be ready for service in July next.

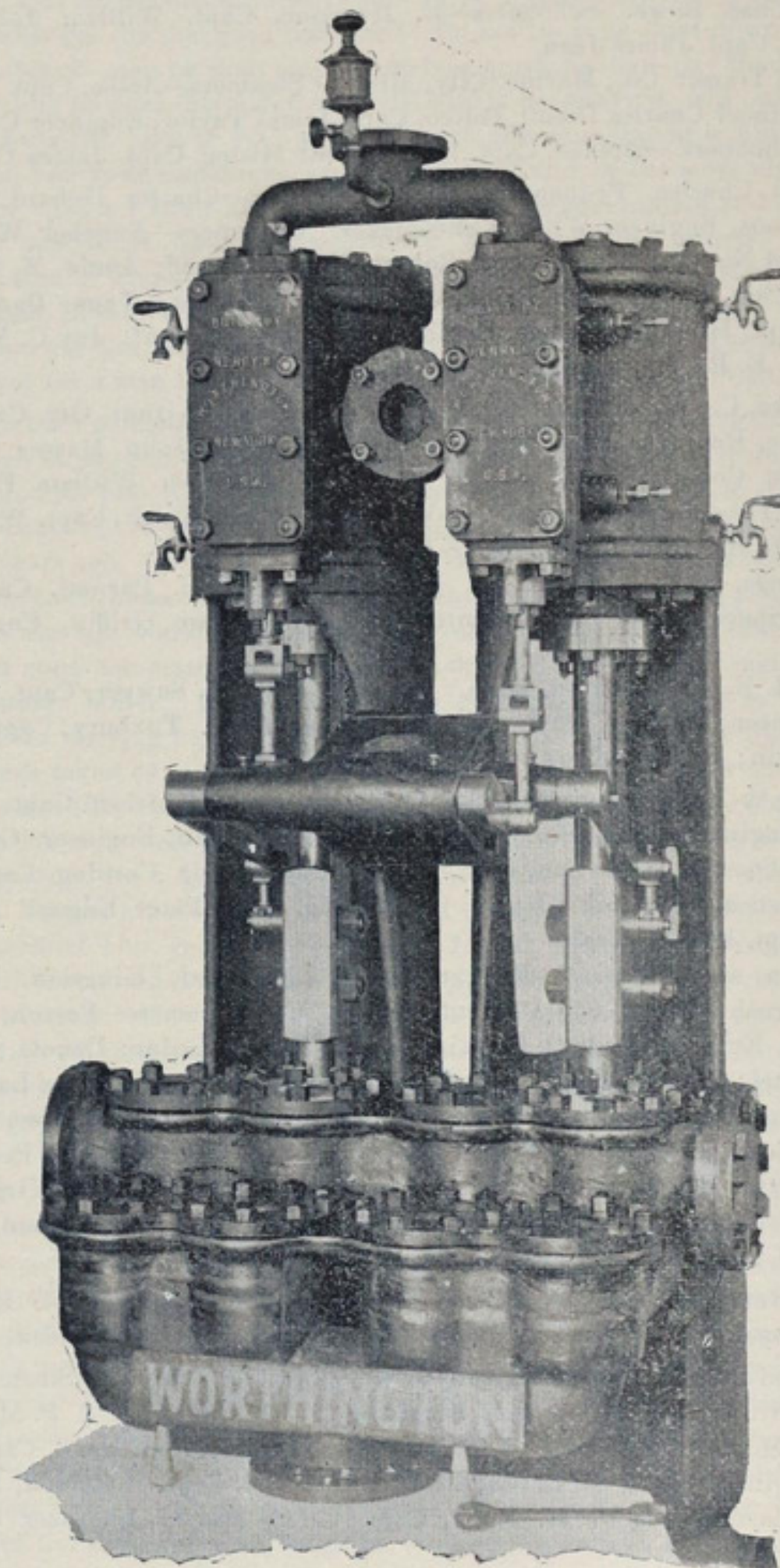
John Duncan has sold the steamer Maggie Duncan to Captains Samuel and Sidney O. Neff of Milwaukee, for \$30,000.

Boiler Feed Pump of the Manitou.

The accompanying cut illustrates a 12-inch by 8½ by 10-inch Worthington vertical boiler feed pump. A pump of the same type but of smaller size will be used on the new L. M. & L. S. T. steamer Manitou, a description of the engines of which appears elsewhere in this issue. This class of pumps was designed by Henry R. Worthington to meet the requirements at the British admiralty and at the same time modified to conform to the views of the United States bureau of steam engineering, whose object was to get a pump occupying the least possible floor space and head room, which will be easy of access to all internal parts, simple and strong in its construction and, by

reason of its superior workmanship and material, shall require the least possible attention and repair. These pumps under test have shown an efficiency of 96 per cent. and are especially efficient under boiler pressures of 150 to 250 pounds.

Two of these large pumps, with solid brass water ends, were installed in each of the American steamships New York



and Paris this winter, and on the first passages of these steamships this year have each furnished water for 10,000 horse power boilers at a maximum piston speed of 30 feet per minute. Henry R. Worthington's agent for the marine trade is W. D. Kearfott, 54 Frankfort street, Cleveland.

Personal Mention.

Capt. W. H. Rounds, representative of the Aetna Insurance Company, has just made a trip around the lakes in the interests of that company.

Capt. J. J. H. Brown and John L. Crosthwaite of Buffalo have returned from a southern trip.

Robt. L. Fryer of the Gratwick, Smith & Fryer Lumber Company of Tonawanda and J. V. O'Brien, general manager of the same firm, were in Cleveland Monday and are understood to have sold a large quantity of lumber.

Capt. Alex McDougall and Henry C. Rouse, president of the Missouri, Kansas & Texas Railway are making a tour of harbors in Texas on the Gulf of Mexico. The Missouri, Kansas & Texas company is planning for a gulf terminal and the American Steel Barge Company has had under consideration for some time the establishment of a barge works in the same locality.

SEND YOUR ORDER FOR "PATTERSON'S NAUTICAL DICTIONARY" (\$5) TO THE "MARINE REVIEW" AT ONCE.

Iron Mining.

VALUE OF LEADING STOCKS.

Quoted by Chas. H. Potter & Co., No. 104 Superior St. Cleveland, O.

Stocks.	Par Value.	Bid.	Asked.
Cleveland-Cliffs Iron Company.....	\$100 00	\$ 53 00	\$.....
Champion Iron Company.....	25 00	26 00	.....
Chandler Iron Company.....	25 00	40 00	41 00
Jackson Iron Company.....	25 00	.....	75 00
Lake Superior Iron Company.....	25 00	28 00	31 00
Minnesota Iron Company.....	100 00	.....	65 00
Pittsburgh & Lake Angeline Iron Co.....	25 00	.....	137 50
Republic Iron Company.....	25 00	.....	10 00
Ashland	25 00	.....	.....
Section Thirty-three.....	25 00	1 00	.....
Brotherton.....	25 00	.....	.....
Iron Belt.....	25 00	2 40	.....
Aurora.....	25 00	6 50	7 00

"Great activity has been going on for the past six or seven months in the north-eastern part of Minnesota" says a correspondent in the Engineering and Mining Journal. "Excellent iron ore in large quantities was found here years ago, but nothing could be done with it on account of lack of transportation facilities. Early last year, Mr. K. Kortgaard, president of the Minneapolis State Bank, and other capitalists succeeded in making certain arrangements with the Port Arthur, Duluth & Western Railroad, in consequence of which the road was extended to the Canadian frontier, and a new company built an extension into Cook county, Minn. The present terminal is on Section 29, township 65, range 4, west, making the railroad distance to deep water at Port Arthur about 95 miles. The railroad companies have granted the Kortgaard-Paulson syndicate very favorable conditions for handling the ore, and the Canadian government very promptly granted facilities for shipping through the province in bond. Ore can be shipped to Cleveland or any other lake port direct from the Gun Flint district on terms thought to be equal to any that Duluth or Two Harbors can afford. The Gun Flint Lake Iron Company, a corporation controlled by John Paulson, K. Kortgaard and some Chicago capitalists, owns about six miles on the iron range, the entire length of which contains Bessemer ore, running all the way from 60 to 68 per cent. iron, low in phosphorus and free from titanium. A town by the name of Gun Flint is now being laid out at the railroad terminus. Mr. Paulson has been superintending a large force of men for the last six months, and is now mining some excellent ore. The railroad will be extended to section 30 this summer."

A member of the Minnesota legislature has introduced a bill providing that in all cases where iron ore mined in the state is smelted in the state royalty above 10 cents a ton shall be refunded to the producer. This bill may not become a law, but it is nevertheless certain that the question of excessive royalties will soon require serious consideration from the mining interests of the entire Lake Superior region.

Mr. Edward Ball, of Florence, Wis., succeeds Charles L. Lawton in charge of the Platt mine. Mr. Lawton goes to Florence, Wis., to take charge of a mine in that state called the Bessemer.

A model of the Chandler mine, Vermillion range, will be exhibited at the World's Columbian Exposition. It will show two shafts with levels, cross-cuts and drifts.

The Diamond Drill of Crystal Falls says that the Dunn mine already has 40,000 tons of ore in stock.

Around the Lakes.

The draft of water in the Sault canal is one inch lower than at this time last year.

Napoleon Grignon has begun work at Duluth on a wooden tug for the Inman line. He will also build a small schooner for Duluth parties.

The official number assigned by the bureau of navigation to the new steel steamer Wm. H. Gratwick, building at West Bay City, Mich., is 81,427.

There is nothing new in the announcement that the whale-backs Washburn and Pillsbury were not satisfactory to the "Soo" railway officials, operating the Buffalo-Gladstone line. The boats were built on a tacit agreement to meet certain requirements,

and at the close of last season, it was understood, had not yet been accepted by the railway people. Whether the differences have since been fixed up or not is not known.

It is now definitely announced that the side-wheel excursion steamer City of Toledo will engage in passenger business at the World's Columbian Exposition. She has been chartered for \$30,000 and will make a good boat for the purpose.

Capt. William Ames will sail the Lake Superior Iron Company's steamer Andaste and Michael Heinkelmann will be chief engineer. Mr. F. B. Smith, who was listed for engineer of the Andaste, will go with Capt. Brown in the Choctaw of the same line.

The half brig Stephen Bishop and the bark Wakefield, both American vessels, and the British barkentine Oak were classed last week in the Record of American and Foreign Shipping, published by the American Shipmasters' Association of New York.

It is now thought that most of the vessels wintering at Milwaukee, the capacity of which is about 2,900,000 bushels, will be forced to go to Chicago for grain cargoes on the opening. There is about 2,000,000 bushels of wheat in store at Milwaukee but no indication of a demand for vessels to take it.

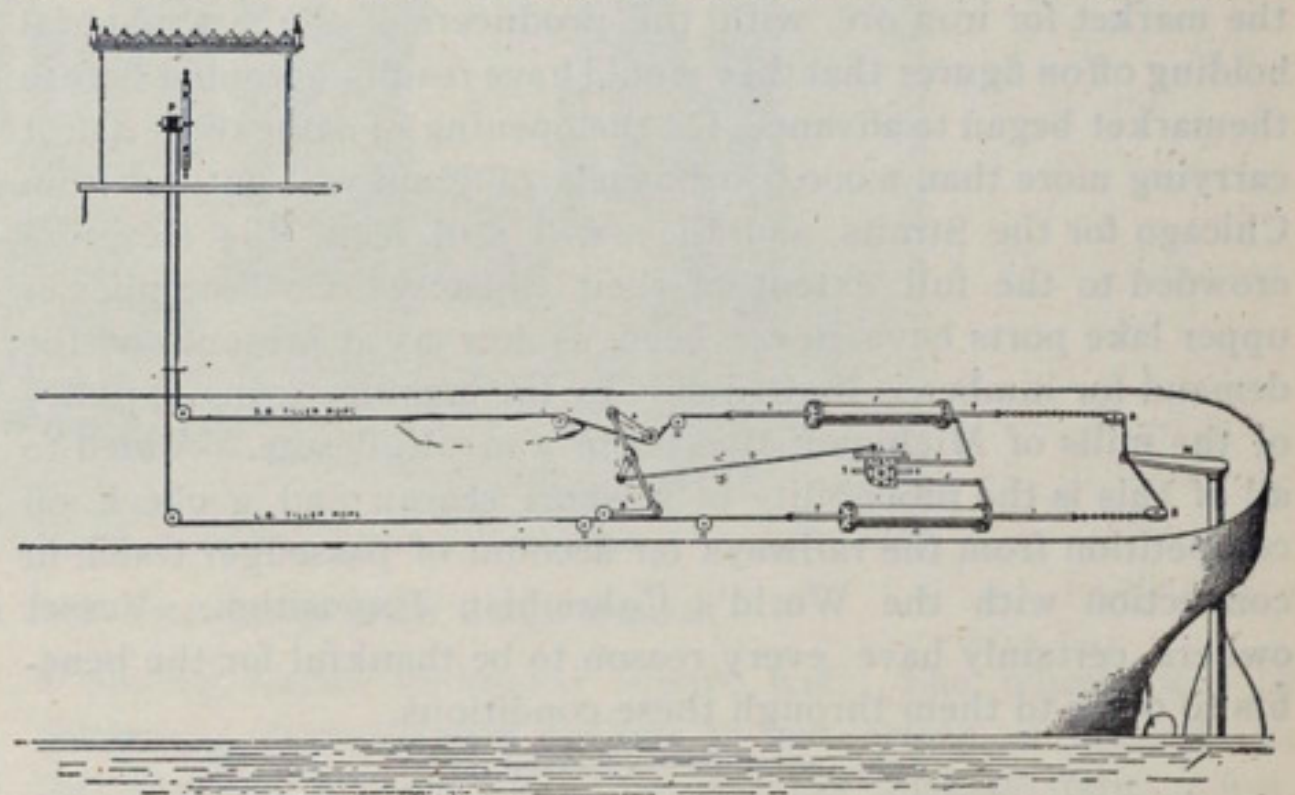
W. A. Collier of Cleveland, Capt Inman of Duluth and some of the tug owners of Buffalo tried recently to form an association of tug owners, to include managers of the different lines around the lakes. The object was not to make any effort to regulate rates, or in fact consider that subject in any way, but to hold meetings each winter for the discussion of subjects of mutual interest and an exchange of views relative to the advancement of the towing business. The effort failed on account of a refusal on the part of some of the Chicago owners to join in the movement.

Steam Towing Machines.

The American Ship Windlass Company of Providence, R. I., has just received an order from the Dominion Coal Company of Boston for two steam towing machines for 1 1/4-inch wire hawser. These machines are the same size as one recently ordered by John Corrigan of Cleveland for the steamer Anrora. The management of the Dominion Coal Company is familiar with the working of these machines, having watched them for the past year on the tow boats Orion and Saturn of the Boston Tow Boat Company's fleet.

Hydraulic Steering Gear.

In reply to an inquiry Crawley & Johnston, Cincinnati, O., say that they have not been effected by the recent flood but they have been flooded with congratulations on the firm working and successful operation of their new steering gear, an illustration of which is shown below. Following are some of the advantages



claimed for it; Sensitive, automatic, light weight, always ready, uses little steam, not complicated, can be put up by ordinary mechanics, no cog wheels, drums or heavy bed plates, can be changed from hand to power instantly, located anywhere on line of tiller ropes, and inexpensive. Write for particulars and prices.

Engineers who would like to read of a man who died from the effects of cleaning flues and afterwards came back to life can get the story by sending their address to the Oliver P. Clay Company, No. 50 Scranton avenue, Cleveland, O.

MARINE REVIEW.

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

Chicago Office, Western Union Building, 110 LaSalle Street.
Published every Thursday at No. 516 Perry-Payne Building, Cleveland, O.

SUBSCRIPTION—\$2.00 per year in advance. Single copies 10 cents each.
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The books of the United States treasury department contain the names of 3,600 vessels, measuring 1,154,870.38 tons in the lake trade. In classification of this fleet the lakes have more steamboats of 1,000 to 2,500 tons than the combined ownership of this class of vessels in all other sections of the country. The number of vessels of 1,000 to 2,500 tons on the lakes on June 30, 1891, was 310 and their aggregate gross tonnage 512,787.58; in all other parts of the country the number of this class of vessels was, on the same date, 213 and their gross tonnage 319,750.84. The classification of the entire lake fleet is as follows:

Class.	Number.	Tonnage.
Steam vessels	1,592	756,751.53
Sailing vessels.....	1,243	325,131.06
Canal boats.....	703	72,515.42
Barges.....	62	20,472.37
Total.....	3,600	1,154,870.38

Tonnage built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

	No. of boats.	Net Tonnage.
1887.....	152	56,488.32
1888.....	222	101,102.87
1889.....	225	107,080.30
1890.....	218	108,515.00
1891.....	204	111,856.45
Total.....	1,021	485,042.94

St. Mary's Falls and Suez canal traffic: Number of boats through St. Mary's Falls canal in 1890, 228 days of navigation, 10,557; tonnage, net registered, 8,454,435. Number of boats through Suez canal during 1890, full year, 3,389; tonnage, net registered, 6,890,014. Number of boats through St. Mary's Falls canal in 1891, 225 days of navigation, 10,191; tonnage, net registered, 8,400,685. Number of boats through Suez canal during 1891, full year, 4,207; tonnage, net registered, 8,698,777. Number of boats through St. Mary's Falls canal in 1892, 233 days of navigation, 12,580; tonnage, net registered, 10,647,203. Number of boats through Suez canal during 1892, full year, 3,559; tonnage, net registered, 7,712,028.

Entered at Cleveland Post Office as Second-class Mail Matter.

Now, more than at any time since the opening of the present year, the vessel interests of the lakes have assurance of another active and profitable season of navigation. At this writing the last requirement to a prosperous season—improvement in the iron market—is at hand, and it is improvement of a substantial kind. Bessemer pig iron has advanced more than \$1 a ton over the prices of a month ago, and pig iron makers are in the market for iron ore, with the producers of the raw material holding off on figures that they would have readily accepted before the market began to advance. On the opening of navigation, a fleet carrying more than 8,000,000 bushels of grain will put out from Chicago for the Straits, and they will still leave the elevators crowded to the full extent of their capacity. Coal supplies at upper lake ports have never been as low as at present and the demand for lumber is limited only by the manufacturing capacity of the mills of Michigan, Wisconsin and Minnesota. Added to all of this is the probability of a short season and a check on competition from the railways on account of passenger traffic in connection with the World's Columbian Exposition. Vessel owners certainly have every reason to be thankful for the benefits to come to them through these conditions.

With a congress that proposes to take up various subjects relative to shipping, naval architecture and marine engineering, and with assurance of a grand display of shipping exhibits at the World's Columbian Exposition, there is no doubt of a fair proving beneficial to the merchant marine of the United States. Models of a large number of naval vessels and modern transatlantic liners, the Cunarders Campania and Lucania and the White Star line triple screw steamer Gigantic among the latter, are already at Chicago or on their way to the fair city, and the exhibit from ship builders throughout England and Scotland is

general and more diversified than had been expected. American ship builders and ship owners will profit through the knowledge to be gained from this exhibit, and in view of the present impetus in shipping here the exposition will in this regard be productive of results especially beneficial.

SOME influential members of the Ship Masters' Association have taken up the work of urging upon the steamboat inspectors the necessity of a change in the system of signals, so that the fog signal will not be confounded with the important porting signal. They should not stop with the effort to secure this one correction of existing evils of the pilot rules of the lakes, that have been neglected for a long time past. Just as it has been said that many collisions might be traced to the evil of a single blast of the whistle for a fog signal as well as a porting signal, so can it be rightfully claimed that numerous similar accidents are due to the lack of uniformity in the arrangement of wheel chains. The ship masters can best settle among themselves the important question resulting from straight and crossed chains, about which so much has been said, and they ought to do so. With a ruling of the majority on this question, the supervising inspectors could be made to take it up and consider the advisability of ordering uniformity in steering.

Three Blasts for a Fog Signal.

At the last regular meeting of the Cleveland lodge of the Ship Masters' Association a declaration, by unanimous vote, was made in favor of changing the rule governing fog signals so that all steamers navigating in thick weather shall sound three blasts of the fog signal, whether running alone or with a tow. Capt. James Stone was given authority to take up with other lodges the proposed change, and it is very probable that before navigation opens the vessel masters of the entire chain of lakes will have petitioned the steamboat inspectors on the subject. The question is, of course, not new but this is the first move of importance made towards a settlement of it. In a letter to lodges in different parts of the lakes, Capt. Stone says:

"By such a change, a fog signal would be made distinctive from a passing signal and could not be confounded with any other signal under the present rules. Where two lone steamers are meeting, each having the other on her own starboard bow, it is impossible to know whether you are hearing a passing signal to the right, or simply a fog signal, and you are never safe in sounding two blasts, as that would act as a cross signal if the officer of the vessel coming in the opposite direction has heard your signal and is intending the one blast as a passing signal. Consequently, both must port their helms, no matter what may be the danger or inconvenience involved; or, if that is not done, there is danger of risking violation of the rule prohibiting cross signals. Thus passing in a fog under the present system of signals is largely guess work, while the proposed change insures almost certain safety.

"I am authorized to ask that this matter be taken up at the next regular meeting of your lodge; that you take such action as will express the feeling of members, and that the same be forwarded to Capt. Charles Westcott, supervising inspector of steam vessels, Detroit, Mich., in order to have the question brought before the board of supervising inspectors at their next meeting in Washington. Prompt action in this matter is necessary, as the government inspectors will certainly hold an annual session before our association has its winter meetings fairly under way next fall, and it may be that a special meeting of the board will be held before long. In any event, failure of action at present will certainly delay this much desired change during another season after the one now at hand."

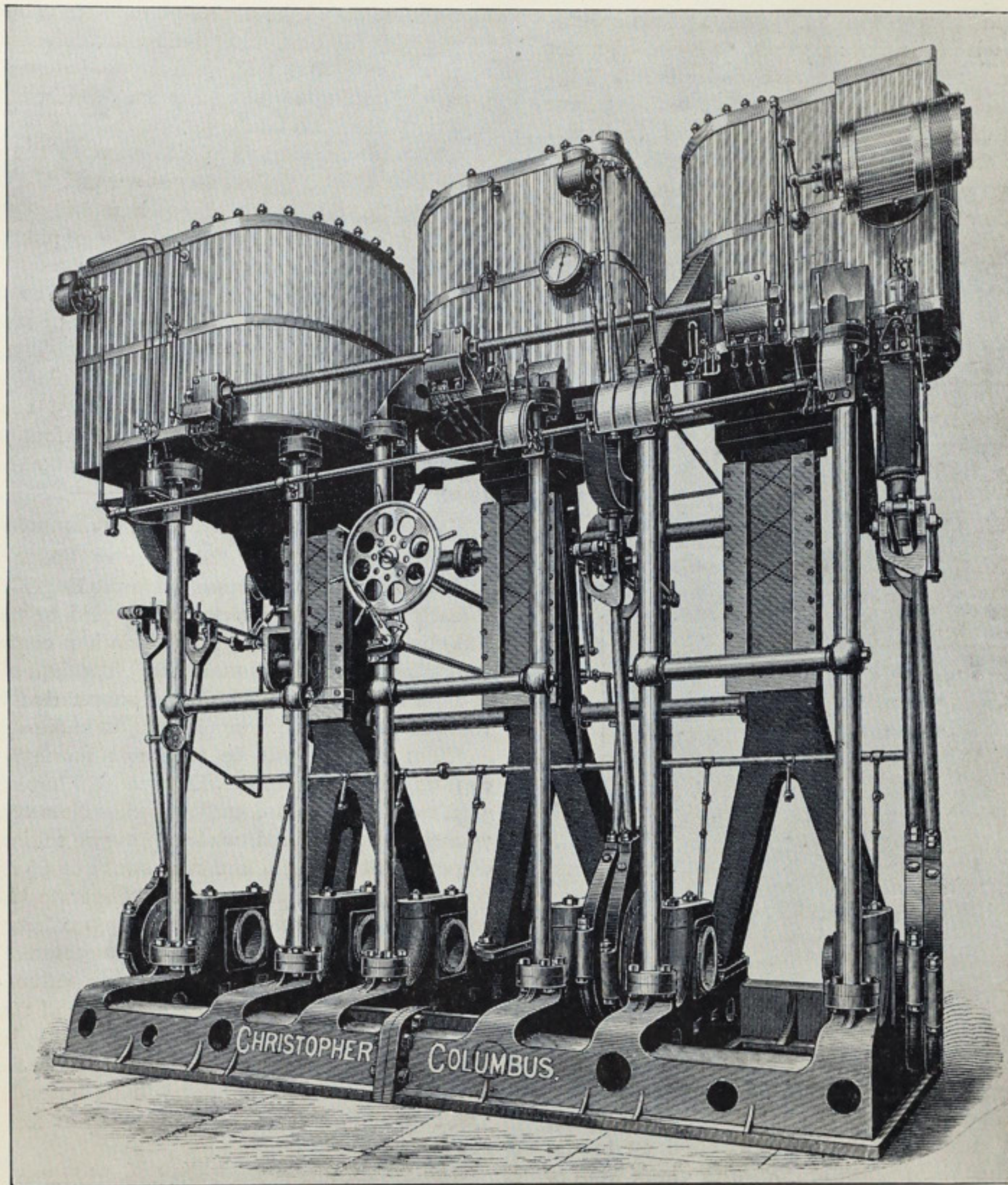
SEND ONE DOLLAR IN STAMPS TO THE MARINE REVIEW FOR TWENTY PHOTOTYPES AND GRAVURES OF LAKE STEAMERS NEATLY BOUND.

Hogde Triple Expansion Engines for the Columbus.

The triple expansion engines built by S. F. Hodge & Co., Detroit, Mich., for the American Steel Barge Company's world's fair passenger steamer, Christopher Columbus, present a number of new features in lake engine building. The engines are shown in accompanying photo-engraved illustration, the original having been prepared by Seaboard. While the engine is not as large by 2 inches in the high and low pressure cylinders and $\frac{1}{2}$ inch in the intermediate cylinder as those in the Chemung and Owego, and have 12 inches less stroke, it is expected that they will develop 3,000 horse power, about 400 horse power more than the Chemung. The cylinders are 26, 42 and 70 inches, by 42 inches

Latest Engine Construction for Paddle-Wheel Steamers.

In view of this issue of the REVIEW being devoted largely to marine engineering, some data concerning the engines of the new Fall River boat Mayflower is reproduced, and a comparison with the screw engines of the International steamers described elsewhere in this issue will prove interesting. The engines of the Mayflower will be compound double inclined with four cylinders. There will be two high pressure cylinders 51 inches diameter and two low pressure cylinders 95 inches diameter with a stroke of 132 inches; revolutions for full power, twenty-five; indicated horse power 8,000. Air pumps will be connected and circulating pumps independent. The surface condenser will have



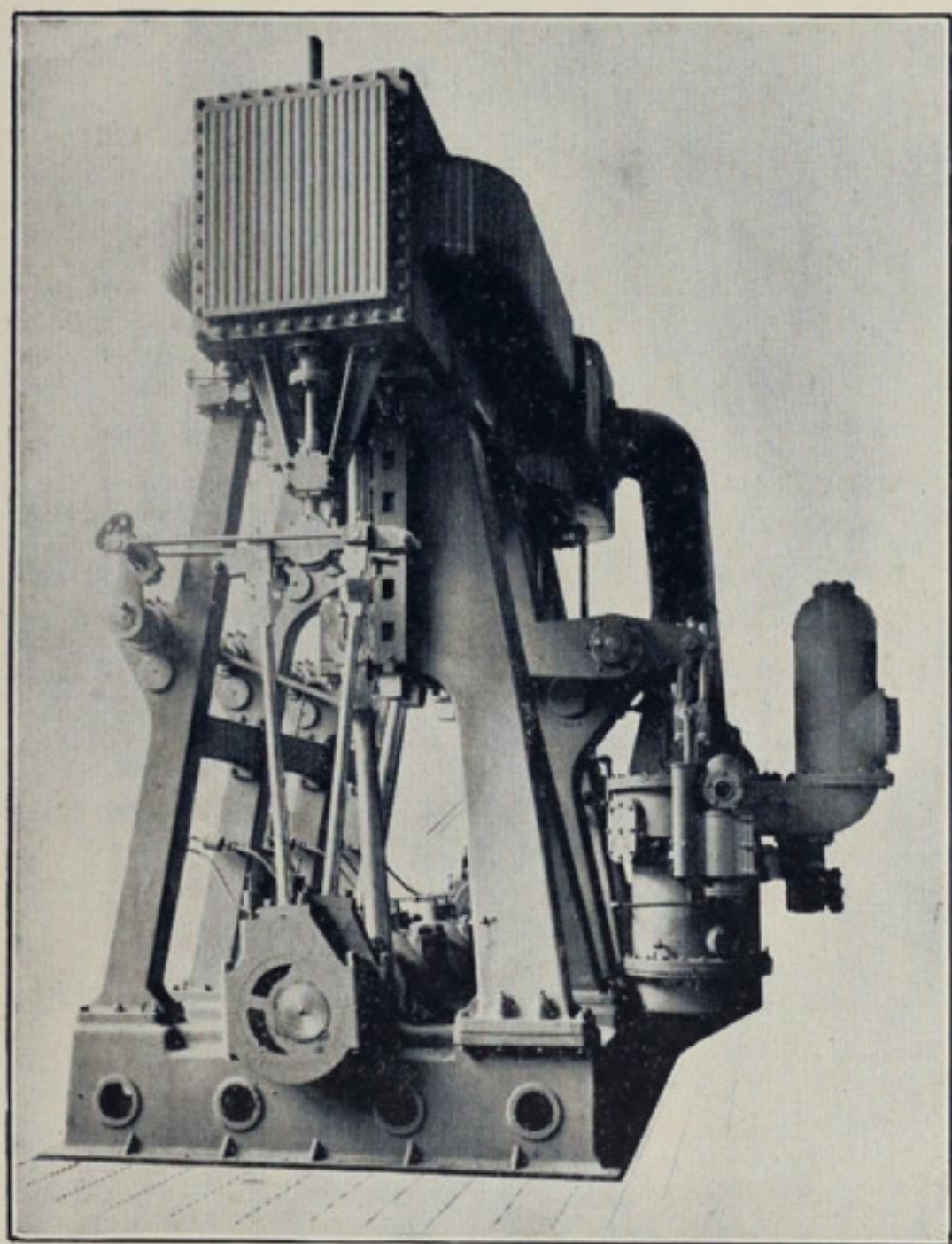
TRIPLE EXPANSION ENGINES FOR THE CHRISTOPHER COLUMBUS.

stroke. The high pressure cylinder has the usual ported valve, the intermediate and low having double ported valves. The valves are worked by independent link motion. A combined steam and hydraulic reverse gear and a worm and hand screw reverse gear are attached. The rear columns are forked, cast iron and the front, as shown by the illustration, is supported by wrought iron rods neatly arranged and secured by cross-rods making a very substantial appearance. The air pump is independent. The finishing work on the engine is very handsome and the machinery entire will attract as much attention as anything of its kind at the fair. The engine was designed by A. G. Mattsson.

a cooling surface of 16,000 square feet. The wheels will be feathering, diameter over buckets 35 feet, width of buckets 14 feet, depth of buckets 5 feet, immersion of buckets, light, 7 feet. There will be ten boilers, Scotch, single-ended of a mean diameter of 14 feet and a length of 14 feet 6 inches. There will be in all thirty corrugated furnaces with an inside diameter of 44 inches, giving a total grate surface of 850 square feet, and a total heating surface of 24,000 square feet. The boilers will be built for a working pressure of 150 pounds per square inch, and arranged for natural or forced draft, as may be desired. W. & A. Fletcher will build the engines, and the hull will be built at Chester, Pa.

Description of the Engine for the Steamer Manitou.

In a previous issue we gave a complete description and picture of the passenger steamer Manitou, now building for the Lake Michigan & Lake Superior Transportation Co., by the Chicago Ship Building Co. Through the courtesy of the engine builders we are now enabled to give our readers a complete description and also a photo-gravure of the engine for this steamer. The boilers also have several features commending themselves for use in this class of vessel. The engines were designed and built by the Cleveland Ship Building Co., and are of a type with which these well-known engine builders have already had considerable experience, but with such changes and improvements as will make the engine particularly applicable to the hard work to which it will be subjected in the steamer Manitou. The engine is a vertical, triple-expansion, with cylinders 23, 38 and 62 inches diameter and 36 inches stroke. The high-pressure cylinder is placed between the other cylinders. Prominent English builders have strongly advocated this arrangement on account of the small losses from radiation from parts subjected to the greatest heat, viz.: the high-pressure cylinder. Apart from this, an inspection of the picture will show that this manner of placing the cylind-



ers gives an exceedingly symmetrical, compact, and yet very accessible arrangement, the valves being much easier to get at than when placed between the cylinders.

The bed-plate is in one piece and has only four journal boxes, lined with Magnolia metal. Each journal is close up to the crank. The crank shaft is of wrought iron, with crank webs of steel, and crank pins of wrought iron pressed in and doweled. The column framing consists of three back and four front columns; two of the back columns are of the A frame type, giving longitudinal stiffness to the framing as do also the ties between the four front columns. The cylinders are bolted together but in such manner as not to interfere with the free expansion of each. The connecting rods are of wrought iron, forked at the upper end, with a single crosshead pin and a bolted connection at the crank pin. The crank pin brasses are lined with Magnolia metal in the same manner as that used by the Herreshoff's in their fast-running engines; the metal is filled in solid in the brasses and not in shallow squares or spots as is customary. This method of fitting the lining metal has given excellent satisfaction, avoiding as it does the old trouble of having the brasses close in on the pins from

over-heating. It is also used in the main journal brasses and the thrust bearing surfaces of this engine. The crosshead is of steel of the slipper type, with a special arrangement for avoiding the unequal wear to which large single slides of brass of this type are frequently subjected. The piston rods are of forged steel. The pistons are steel castings, single thickness, cone shaped, and each piston is fitted with two square cast iron packing rings. The valve gears are all of the ordinary double bar link type. The builders have fitted this type of engine with Joy's patent valve gear on the high pressure valve, but in this case it was desirable to have the working parts of the high pressure cylinder more accessible than is the case with the Joy gears used. The high pressure cylinder has a piston valve, and the intermediate and low pressure have double-ported slide valves. The air pump, bilge pump and cold water pumps are driven from the high pressure engine. The feed pumps are independent, of the well-known Worthington make, and are described and illustrated in another part of this issue.

The thrust shaft is placed next to the crank shaft, is of wrought iron with collars forged on, and the thrust bearing is of the horseshoe type, with Magnolia wearing surfaces. The screw propeller is 13 feet diameter, and 16 feet pitch, of cast iron, with a spherical boss, having a conical tail piece. The blades are four in number and adjustable on the hub. The shape of the blades is elliptical, and an effective driving surface is formed by the generating line slightly inclining backward. The engine is operated from the main deck in the manner so popular with lake engineers. The engine will ordinarily be run at about 110 turns per minute, and we expect later on to publish the performance, and give indicator cards showing the power developed by this engine.

Engines of the New Cunarders.

The description of the hulls of the two new Cunarders Lucania and Campania appeared in the English technical journals recently, and has been very freely copied by trade publications in this country, but none of the descriptions contained the details of the engines, sizes of cylinders, etc. Through kindness of a friend in close touch with ship building information on the Clyde, the REVIEW presents what was lacking to make a good description.

The engines will be the most powerful triple expansion engines ever constructed. Each set will have five inverted cylinders, two high pressure, each 38 inches diameter, one intermediate, 75 inches diameter and two low pressure engines, each 100 inches diameter, all having a common stroke of 66 inches. There will be two engines in each steamer to operate the twin screws, and each engine is expected to develop 15,000 horse power, making a total of 30,000 horse power in each steamer. The high pressure cylinders will be placed above the low pressure cylinders. Steam will be furnished at the ordinary pressure of 162 pounds by twelve boilers, 17 feet 5 inches by 18 feet 9 inches, having 96 furnaces, giving a total grate surface of 2,250 square feet. It is expected that 500 tons of coal per day will be burned in these furnaces. The two funnels for each steamer are 21 feet diameter, and are 120 feet high.

These engines are required to drive the boats 23 knots an hour. The vessels, building by the Fairfield Company, Govan, Glasgow, are larger than any now afloat in general dimensions, displacement and horse power. The Campania measures 600 feet between perpendiculars, and 65.7 feet beam, being only 80 feet less in length than the Great Eastern, and 17 feet less in width. The next largest vessel is the Teutonic, which is 34 feet less in length and 8 feet narrower. The gross tonnage of the Campania is about 12,000, and her displacement will probably be 16,500 tons on 25 feet draft. The rudder is of the single plate type, being formed of a heavy steel casting with massive arms, between which a thick plate is fitted and riveted. This plate is in one piece and weighs about 10 tons, the whole rudder weighing about 24 tons. Each complete stern post weighs about 90 tons, and consists of four pieces which are riveted together.

Propelling Power of the American Ships.

TWO QUADRUPLE ENGINES OF 7,000 HORSE POWER EACH—THE HIGHEST POWERED QUADRUPLE ENGINES EVER BUILT.

The engines of the new American ships to be built by Wm. Cramp & Sons for the International Navigation Company will be the most powerful quadruple expansion marine engines in the world. They will be required to develop about 7,500 horse power each. The cylinders will be 36, 50, 71 and 100 inches by 60 inches stroke, two sets of engines being placed in each boat to turn the twin screws, which will be sectional with three blades. Steam will be furnished at 210 pounds pressure by six steel double-ended boilers, 20 feet long and 15 feet 7½ inches diameter, the battery to have 48 Purves' furnaces, 39 inches diameter and to be fitted with Serve's patent tubes. The total grate surface will aggregate 820 square feet, and the heating surface about 30,000 square feet.

Piston valves will be fitted throughout and operated in the usual manner. The crank-shafts, eccentric straps and connecting rods will be of forged steel and the piston rods will be of ingot steel. The valve gear will be of the link type, controlled by a steam cylinder, and also by an auxiliary hand gear. Many features will be added to insure the perfect working of these engines.

The columns will be of cast steel, forked at bottom. The thrust blocks will be of the usual horse-shoe type, and the thrust shafts are to be about 13 feet long. The line shafting will be of forged steel, the bearings to be of cast iron. The air pumps will be attached but the condensers will be independent.

This general description will serve to give an idea of the engines that will be expected to maintain the dignity of the American flag in the 20-knot class of the great Atlantic liner race. Quadruple expansion practice has never been applied where more than 4,000 horse power was required in marine service and only two or three boats have quadruple engines of that power. It is to be understood that these new ships are not to be racers, although there will probably be only three boats in the Atlantic fleet that will distance them, but when these four boats are built, as mentioned in the REVIEW of last week, and European builders have done their best, then the International will have built at Cramps a boat known as the "world beater." She will have something like 40,000 horse power, and the screws will be more than twins, triplets at least, and quadruplets possibly.

In another part of this issue there is a description of a marine engine built 44 years ago, which developed a horse power to every 972 pounds of machinery, while the machinery described herewith will give nearly five and one-half horse power for every ton of machinery. If no advance in marine engineering had been made since then, the machinery in the new American ships would weigh over 7,000 tons, and take up half of the displacement on 26 feet draft, exceeding the required carrying capacity by over 2,000 tons.

in observing and carefully noting the conditions under which the several voyages are made, together with all obtainable data concerning the propeller, hull and power developed by the main engines. In collecting all this, accuracy is most essential, especially as to the propeller, and in this way errors are more frequently made than in measuring the pitch. If this is wrong the other notes are worse than useless.

"To those interested in this matter, the following method is suggested as being simple and free from the inaccuracies attending most of the usual practices. Preliminary work occupies but about an hour, yet it is the principal part of the operation, and the result so satisfactory as to repay the operator.

"The ship being in dry-dock, and access to the propeller provided by ladder or staging, it is first necessary to have the forward face of the hub A, Fig. 2, and that portion of the shaft between this face and the stern post or after bearing, thoroughly scraped clean. Then carefully caliper the diameter of the shaft and also the hub at a distance of one inch from the face, at C D. Measure roughly the distance from the root of the blade to its tip, and with these several dimensions proceed to the carpenter shop of the dock-yard, or on board ship, where have made a span and square, as follows: Lay down, on a smooth floor or board, the shaft circle, and from the same center also strike the hub circle, as found; then to the back of a piece of $\frac{1}{2}$ inch white pine 6 inches wide and a trifle longer than the blade measure, attach firmly two white pine legs (two inches wide by $\frac{1}{2}$ inch thick) in such a manner that they will be exactly tangent to the shaft circle when the bottom of the board is just above the hub circle, Fig. 1. Secure the apparatus temporarily in this position, while with a chalk line a radial from the center is marked up the middle portion of the board, and along this line, leaving it just clear, tack a straight $\frac{1}{2}$ inch batten. Mark on this radial the distances in feet from the center, say 2 feet, 3 feet, 4 feet, &c., as points from which to measure the pitch. Now, with a radius equal to the hub circle, C D, mark on a thin piece of board a quadrant and divide it into degrees by a protractor or by stepping it off, and saw out this, as shown, Fig. 3. This piece R must be secured to the span, as shown in Fig. 1. A common wooden square, with rather wide back and one side flush to bear against the batten, completes the implements needed, this square being marked in inches and eighths from the base outward, as we do not wish to be trammelled with tape line or rule when at the hub.

"Being now ready for rapid work, let us measure the pitch at one point to show the application, say at the 4-foot radius. Place the span on the shaft, where it will rest on its tangent legs, and press it closely against the forward face of the hub. Swing it so that the square, when placed in position, with its base at the 3-foot mark and bearing on the radial batten, will just touch the forward edge of the blade X. Make a mark at this point, noting its distance from the board, on square scale, and also scratch a mark on the hub opposite the O mark of the quadrant. Now move the span around so that the square when again adjusted will just touch the after edge of the blade. Note

High Pressure Boilers.

The capacity of a boiler to generate steam must be measured primarily by the amount of fuel it can be made to consume. It will astonish some of our readers to know that in boilers of the Scotch marine type, Messrs. John Brown & Co., Limited, of Sheffield, England, by what they term their patent combination draught, are developing at their works 800 indicated horse power with a boiler 10 feet 6 inches diameter by 10 feet 6 inches long, fitted with two Purves' ribbed steel furnace flues, 34½ inches inside diameter by 7 feet 6½ inches long, and 162 Serve's ribbed steel boiler tubes 2¼ inches outside diameter, of both of which articles they are the manufacturers, and C. W. Whitney, No. 81 Fulton street, New York, is the agent. An illustration of the furnace is shown herewith. Ordinarily, from 12 to 16 pounds of coal with natural draught and 20 to 25 pounds of coal with forced draught is the average consumption per square foot of grate surface per hour in marine boilers, but Messrs. John Brown & Co. are burning 45 pounds of coal per square foot of grate per hour, so that from this statement may

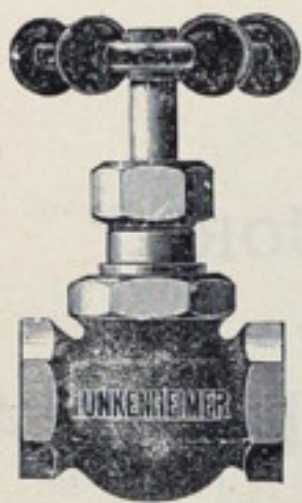
be seen the rapid strides that are being made in the development of power in boilers. This means much less space required for boilers on sea or land, and much less cost in producing power.

A PUBLIC MEETING OF THE BOARD OF Engineer Officers designated by Special Orders No. 7, Headquarters Corps of Engineers, in accordance with joint resolution of Congress, approved February 3, 1893, directing the Secretary of War to investigate the subject of raft towing on the great lakes and their connecting waters, will be held at the U. S. Engineer Office, 34 West Congress street, Detroit, Mich., at 10 a. m., April 6, 1893. All persons interested are invited to present their views in regard to the matter in writing, in duplicate, either in person or by mail. 9-16-23-30

PROPOSALS FOR DREDGING. U. S. Engineer Office, Hickox Building, 185 Euclid Ave., Cleveland, Ohio, February 26, 1893. Sealed proposals for dredging in harbors at Cleveland, Fairport and Ashtabula, Ohio, will be received at this office until 2 o'clock p. m., standard time, of Tuesday, March 28, 1893, and then publicly opened. Specifications, blank forms, and all available information will be furnished on application to this office. JARED A. SMITH, Lieut. Col. Corps of Engineers, U. S. A. 9-16-23

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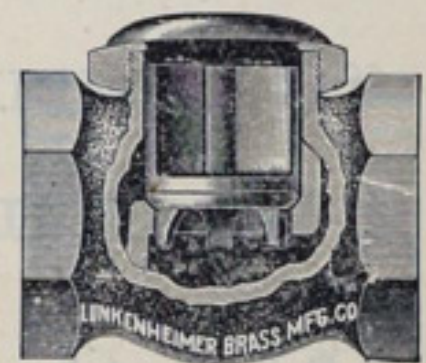
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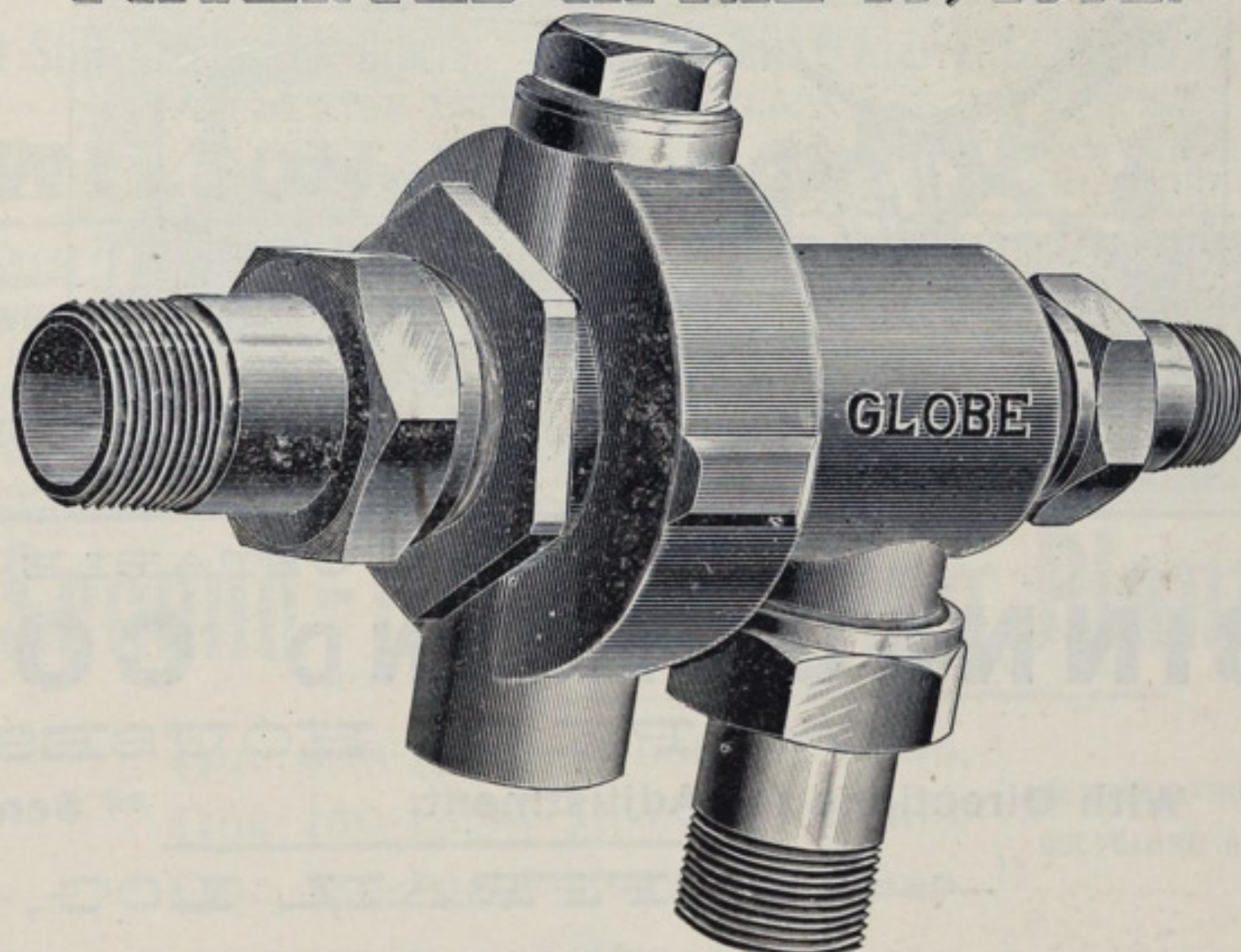


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Fig. 205.

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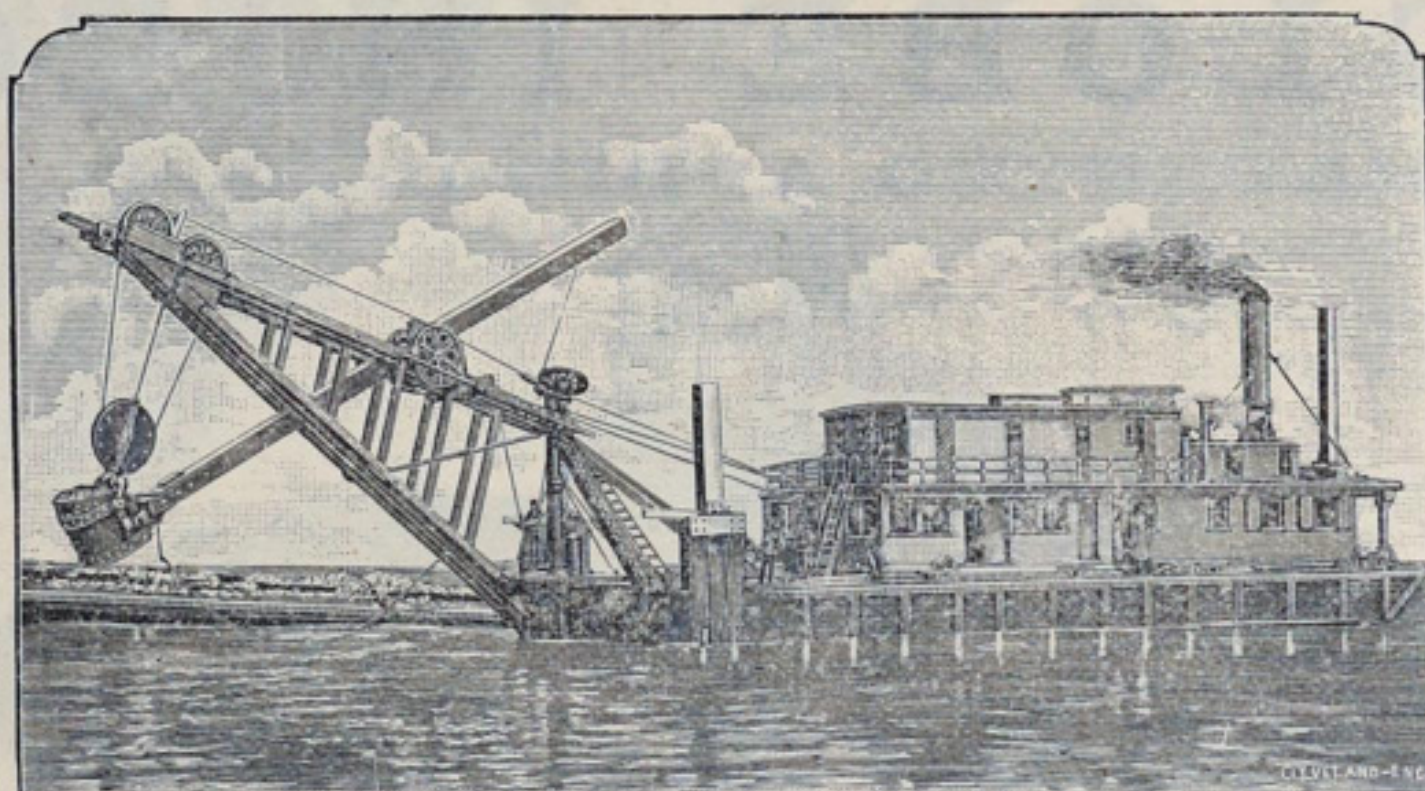
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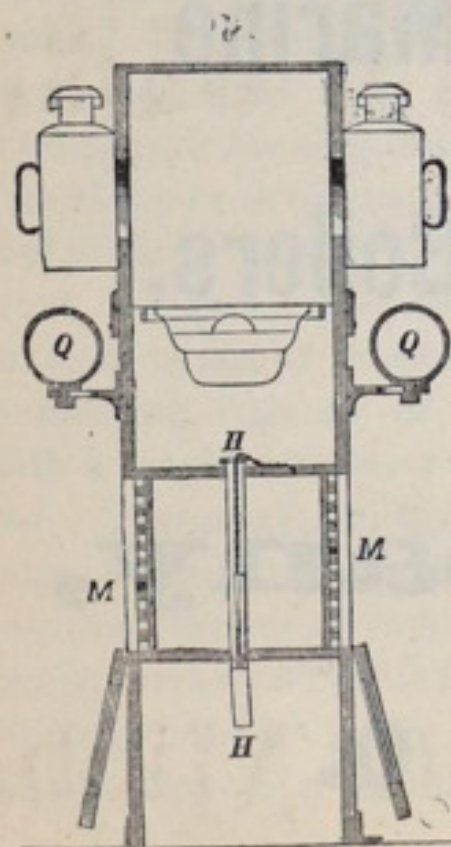
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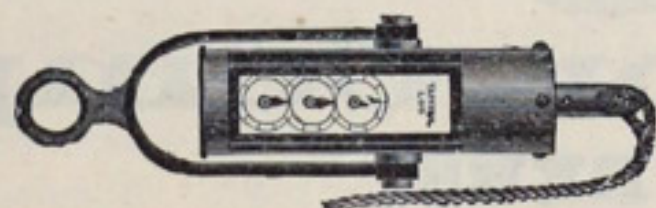
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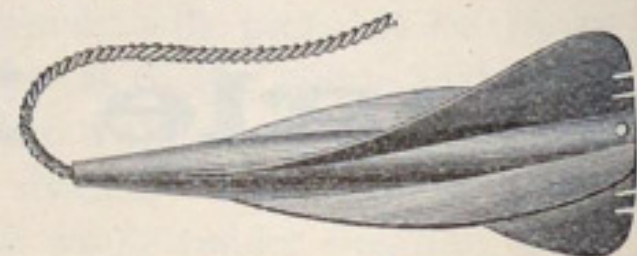
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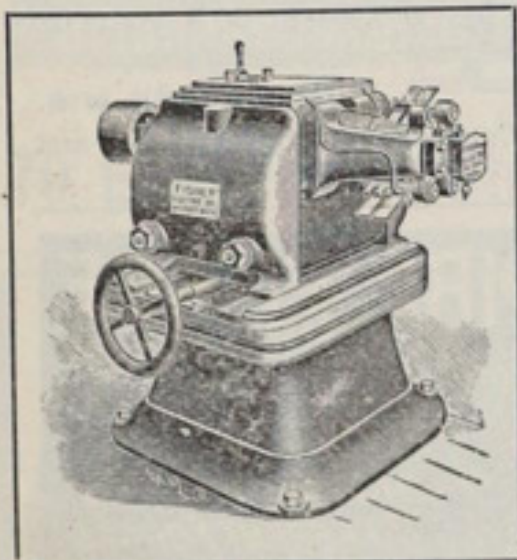
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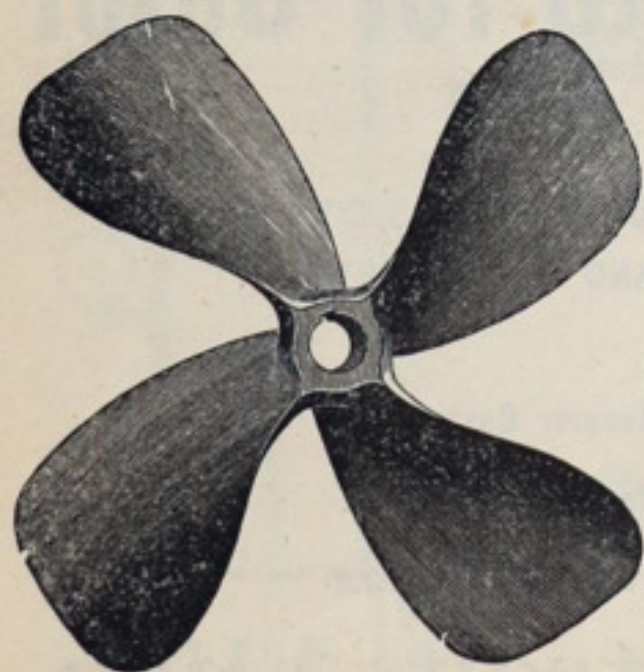
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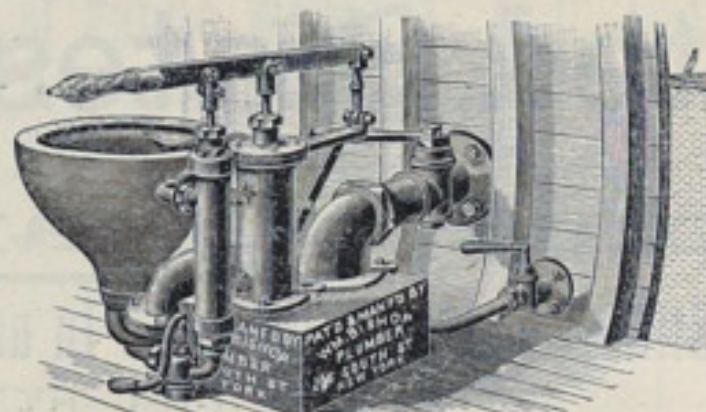
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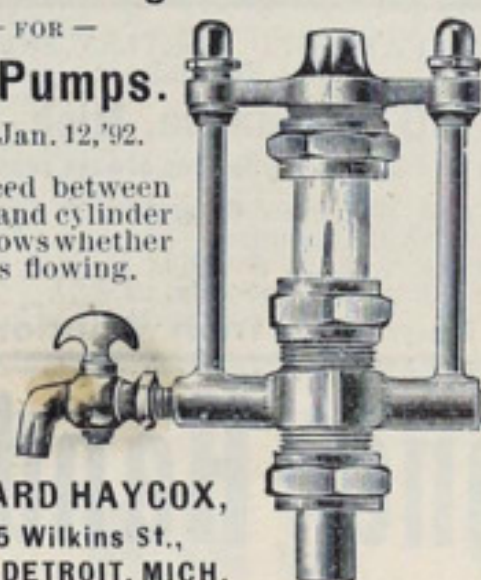
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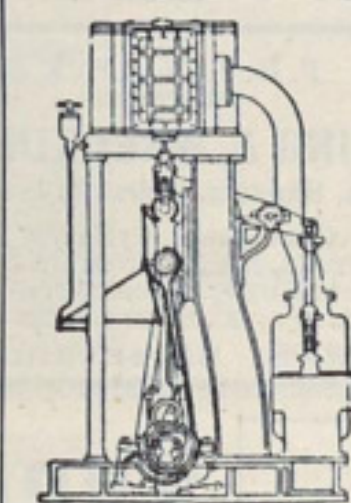
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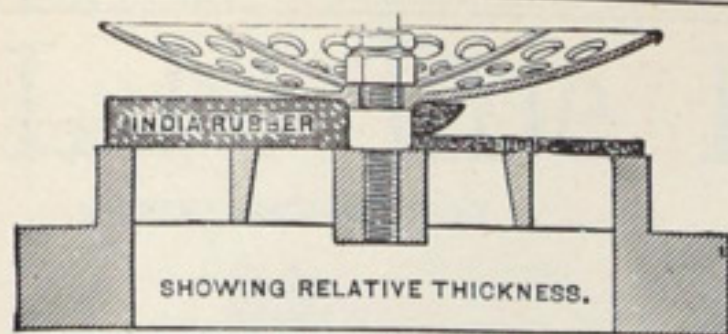
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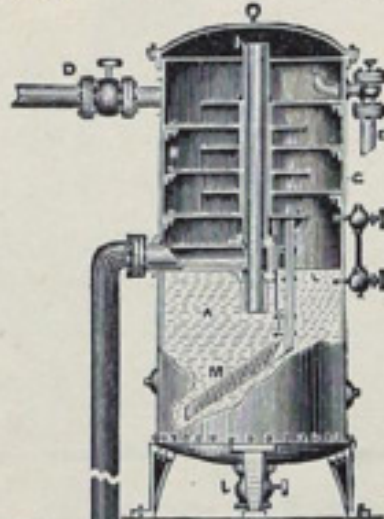
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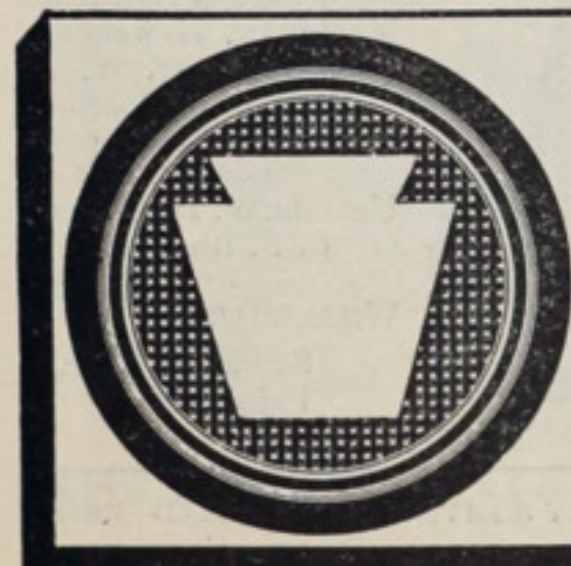
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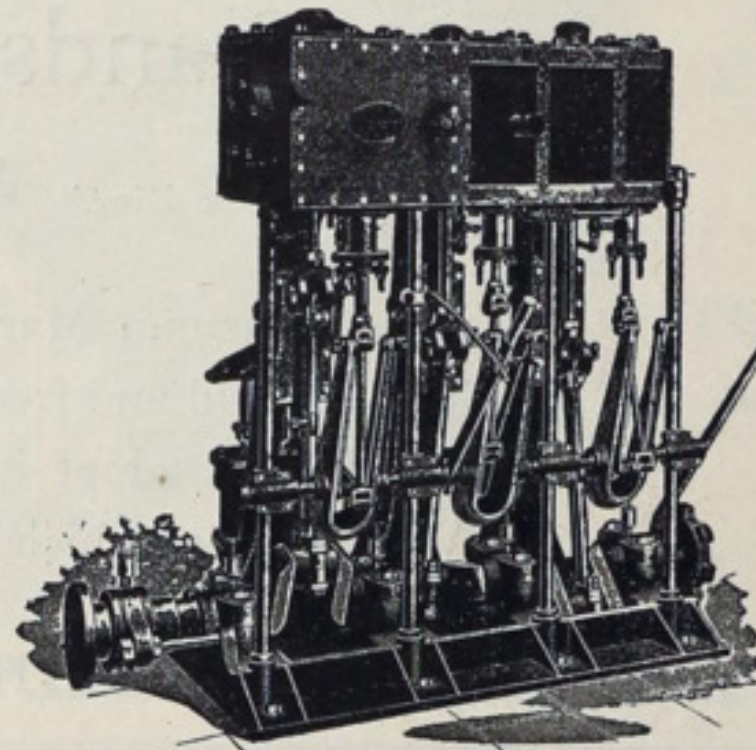
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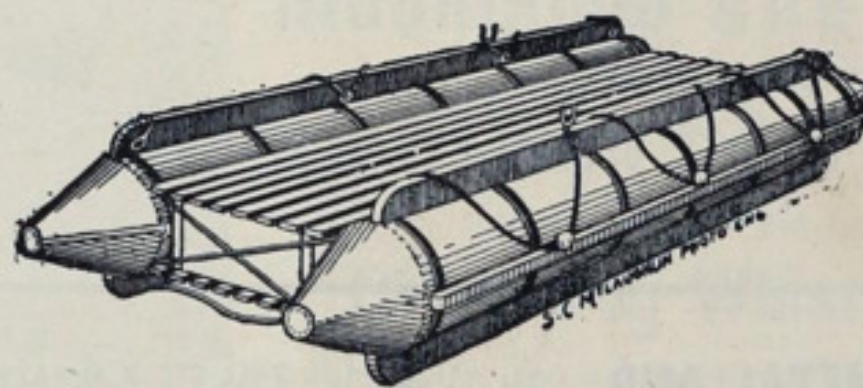


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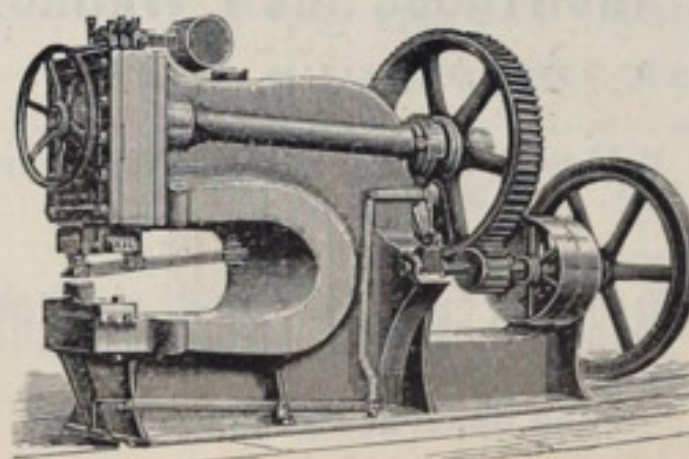
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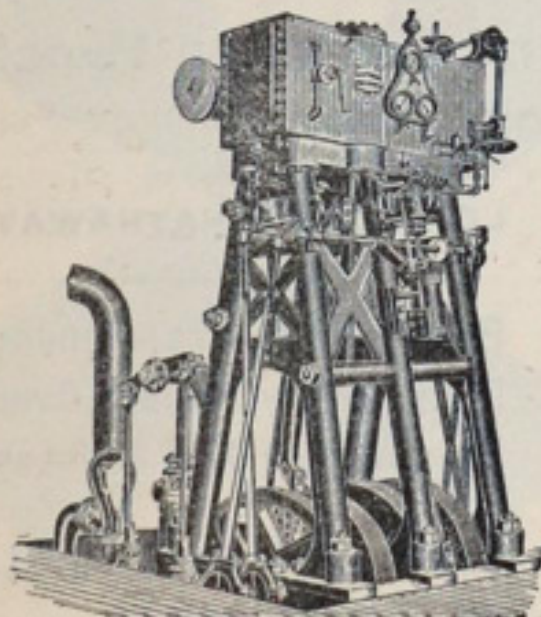
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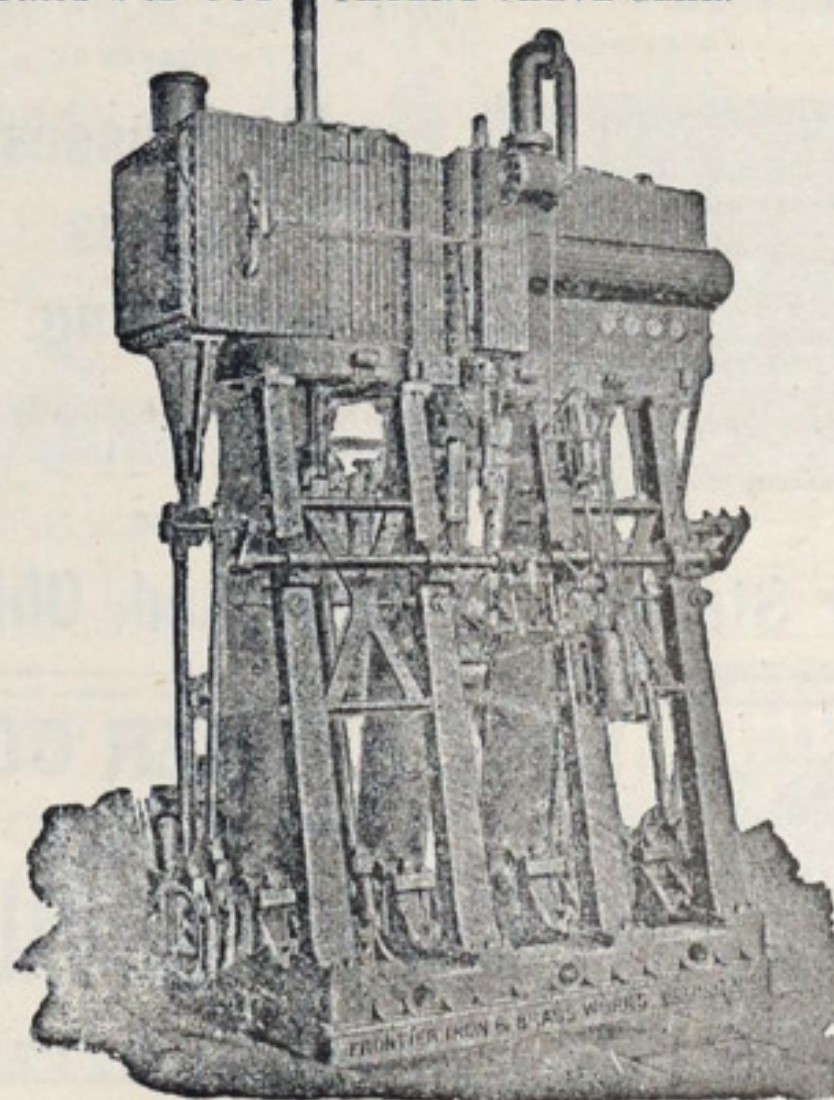
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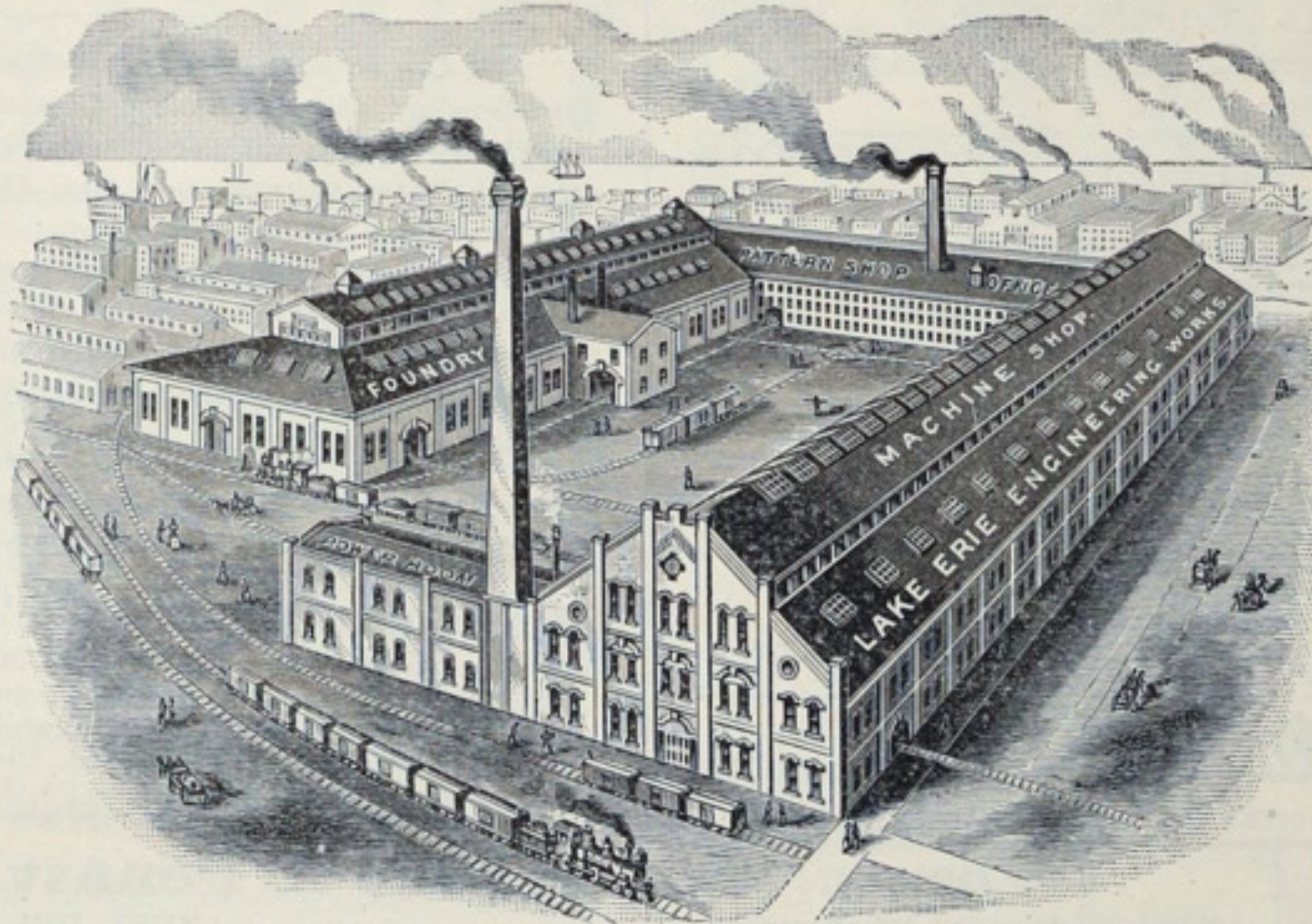
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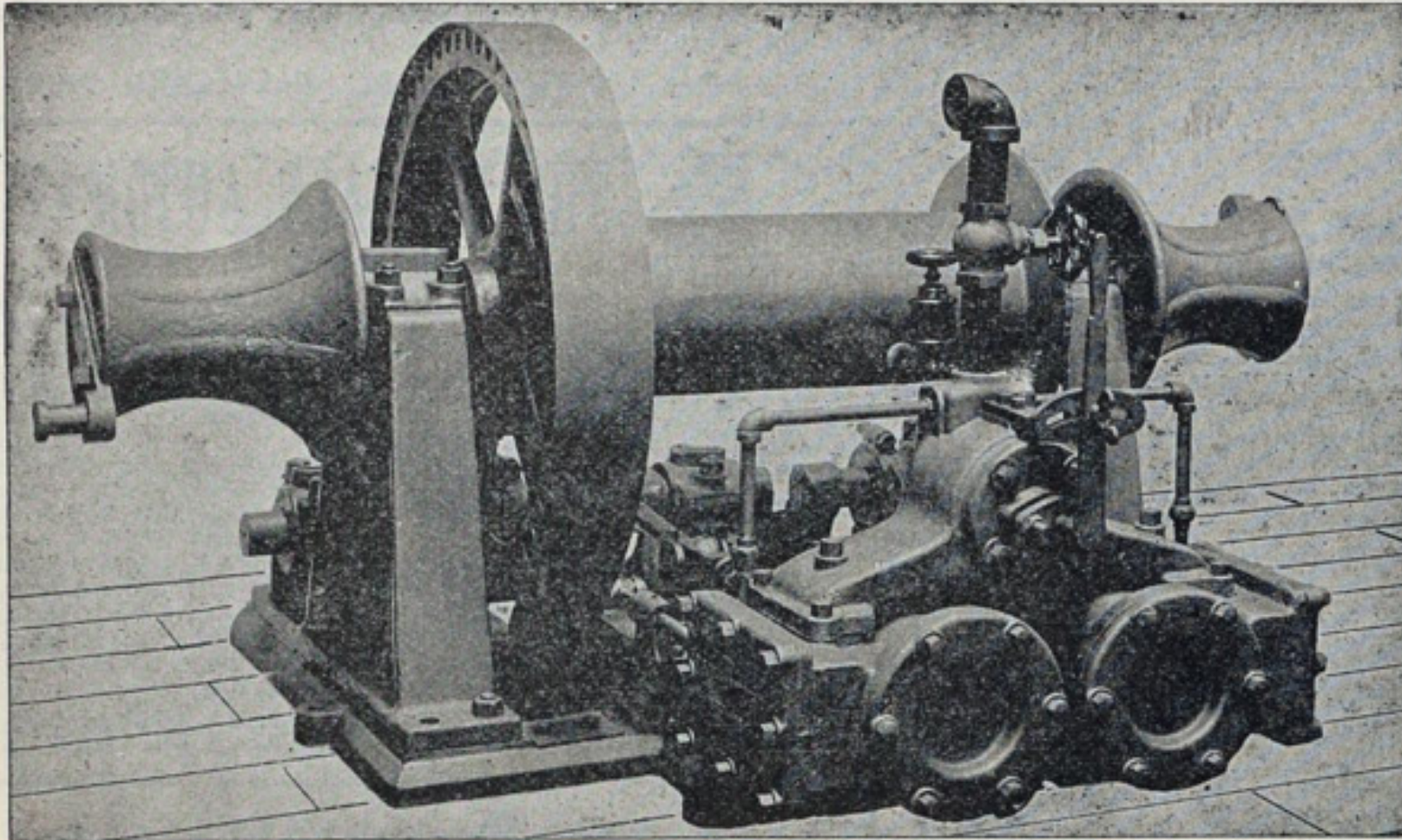
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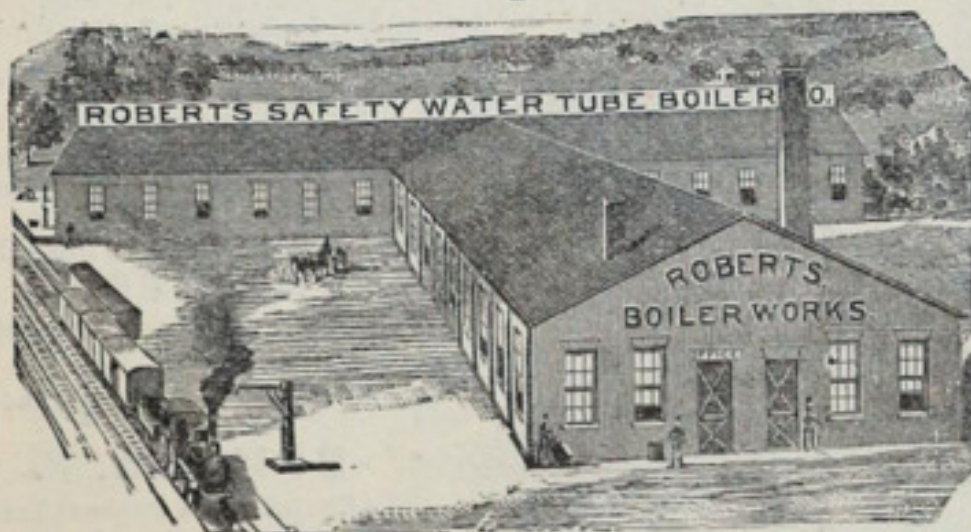
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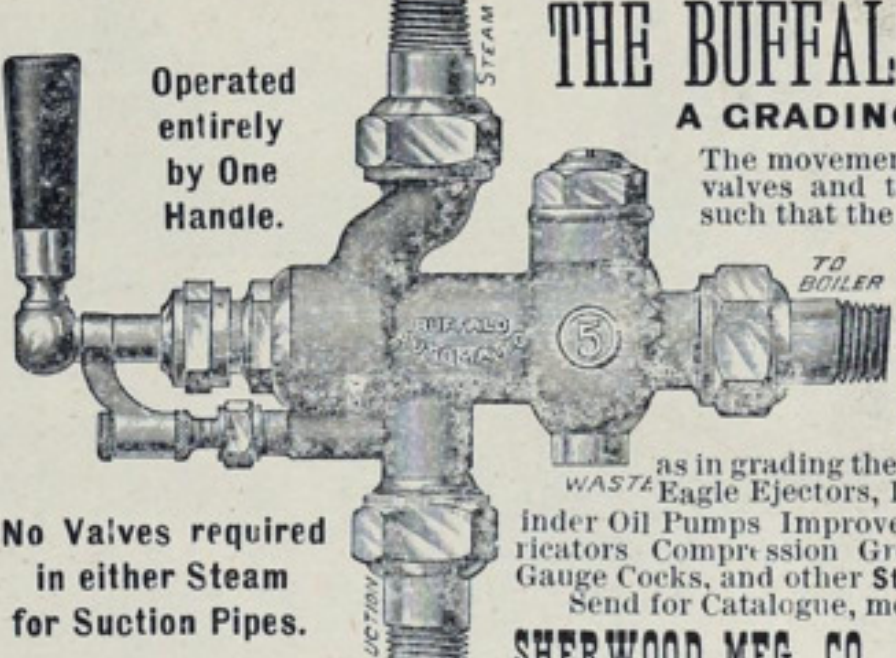
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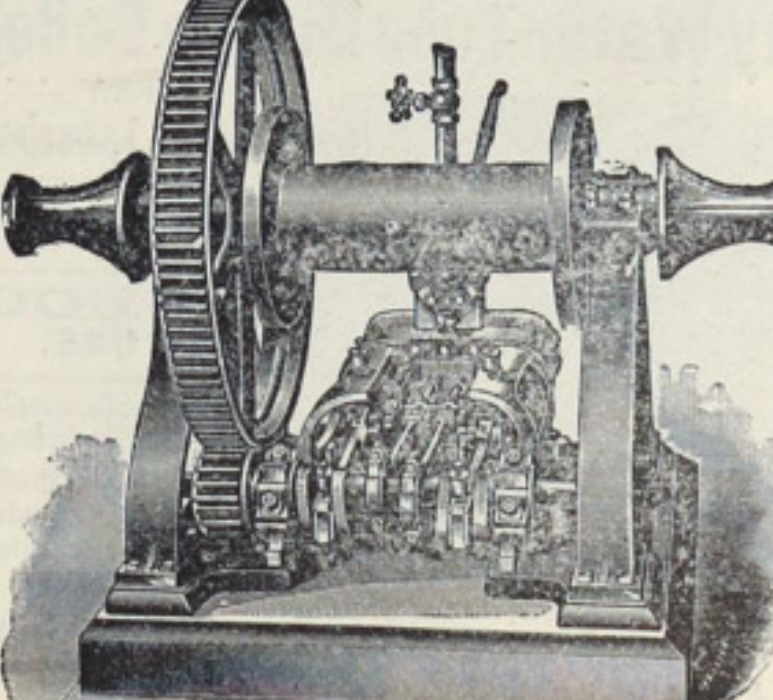
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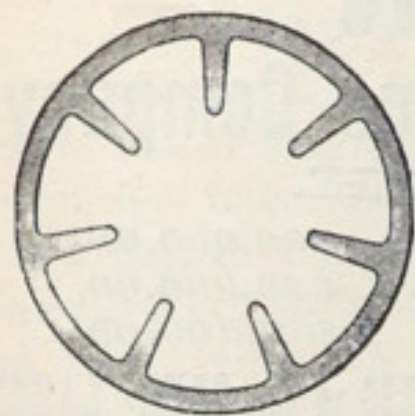
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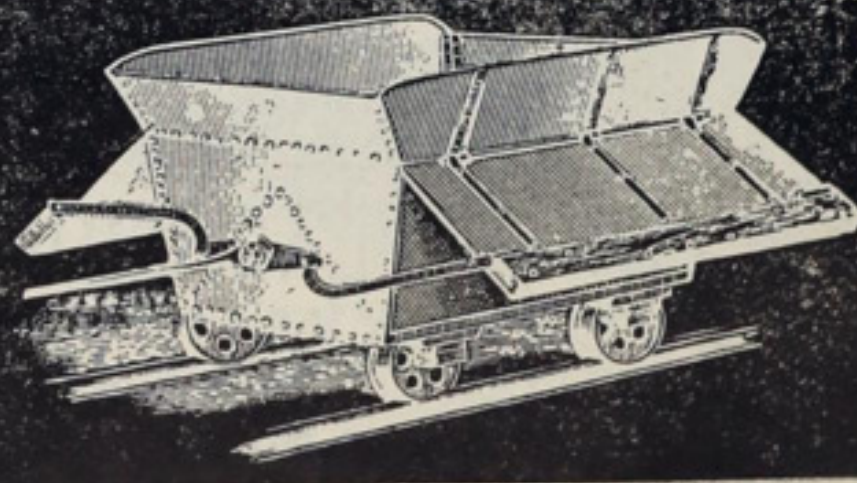
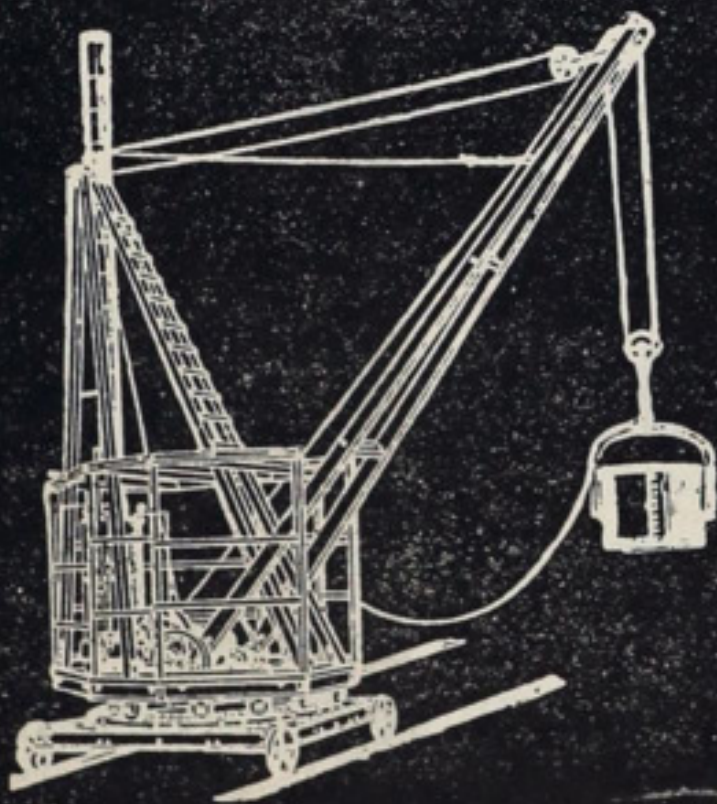
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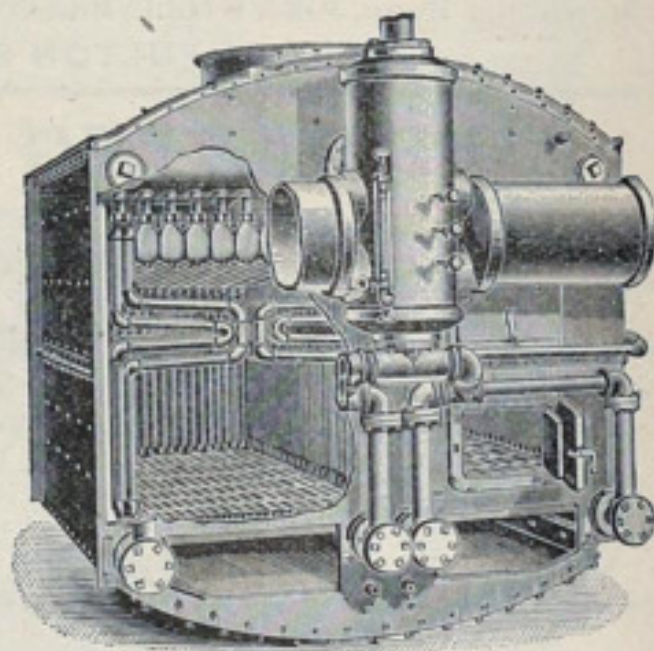
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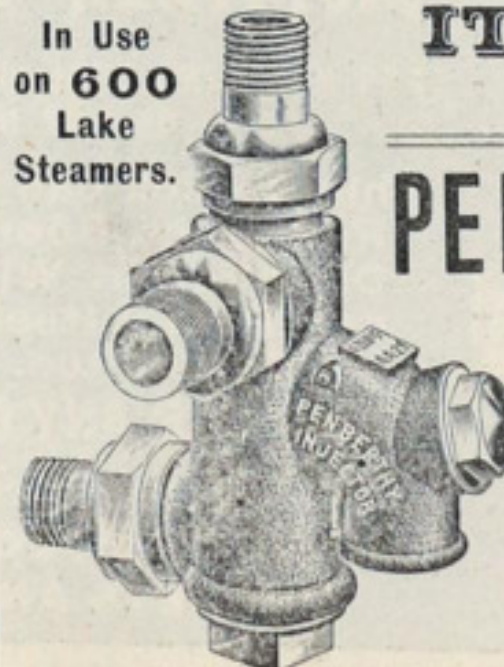
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